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Toward a Model for Predicting Depression Among Veterans

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The University of Southern Mississippi

TOWARD A MODEL FOR PREDICTING DEPRESSION AMONG VETERANS

by

Nita Aurora Magee-Cornelius

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2013

ABSTRACT

TOWARD A MODEL FOR PREDICTING DEPRESSION AMONG VETERANS

by Nita Aurora Magee-Cornelius

May 2013

Major depression, identified as a leading cause of disability in the United States, is often first diagnosed by primary care providers. This disability is associated with increased morbidity, mortality, and a lower quality of life. With approximately one in every three veteran diagnosed with depression and the rate of suicide increasing in the United States military (Department of Veterans Affairs, 2009), the Patient Health Questionnaire-2 items (PHQ-2) can be instrumental in identification and monitoring of depressive symptoms. The purposes of this retrospective study were to determine the prevalence of depression, as measured by the federally mandated PHQ-2 in the VA, and to create a model for predicting depression based upon the results and associated variables.

A combination of Donabedian's Quality of Life model and Shaver's *Biopsychosocial View of Human Health* model comprised the conceptual underpinnings for the predictive correlational design employing one year of retrospective data for veterans receiving outpatient primary care at the selected federal agency to with a goal of identifying the presence or absence of depression (dependent variable) and biological, social and environmental factors (independent variables). A sample size calculator was used to calculate the number of charts necessary for a representative sample ($n = 300$) and charts were randomly selected. Based on inclusion criteria, the final sample size was

140 veterans. Although, the process of developing a theoretical model was not supported with the research findings, there are strong clinical indications for this veteran population.

These results for depression, 18.7%, were lower than those reported in the literature. Limitations of the study were the use of a convenience sample and lack of sufficient documentation within the electronic medical records. With the primary care setting often being the first interaction for seeking healthcare, implications for nursing practice include a need to develop more robust strategies to improve recognition of depression. This strategy would include the consideration of the patient's biological, social and monitor biological, social and environmental factors.

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A Dissertation
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May 2013

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Through this entire process, both personally and professionally, I have learned a lot model I attempted to promote. I am a stronger bio-psycho-social and spiritual being with an even greater purpose for my career. I want to continue to serve the veterans to the best of my ability and take even the smallest lesson learned and make changes in my workplace.

I would like to express my sincere appreciation to Dr. Sheila Davis who served as my dissertation committee chair. I truly will say without her knowledge, guidance and enthusiasm, I would have given up two year ago. A major attribute Dr. Davis that illuminates from Dr. Davis is her patience. She had a lot of patience as I encountered multiple personal setbacks. I would further like to extend my gratitude to Dr. J. T. Johnson for his statistical expertise, dedication and guidance. I would also like to thank the other committee members, Dr. Bonnie L. Harbaugh, Dr. Janie Butts, and Dr. Anita Boykins, for their patience and understanding with the multiple obstacles encountered and for their expert knowledge. Lastly, my deepest appreciation and thoughts are extended to my family and colleagues for their love, encouragement and support through this educational journey.

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CHAPTER I

INTRODUCTION

Depression is a major public health problem health problem associated with increased morbidity, mortality and lower quality of life. Individuals, families, businesses and society are all affected by depression. It is the leading cause of disability in persons over 15 years old (United States Preventive Services Task Force [USPSTF], 2009). Further, major depression is identified as a leading cause of disability in the United States (U.S.) (Machado & Tomlinson, 2011). Primary care providers are often the first to diagnosis and treat depression (Saver, Van-Nguyen, Keppel, & Doescher, 2007). Difficulties in diagnosis relate to the fact that depressed individuals often presents with vague physical symptoms inclusive of fatigue, energy loss, difficulty with concentration, weight loss or gain, and sleep disturbance. Classified both as a broad spectrum and a wide range of severe symptoms, an individual experiencing depression may describe feelings such as helplessness, worthlessness, and guilt or shame. Their perception of life events appears more negative than one not depressed. Early detection of depression with appropriate follow-up as indicated is important (Li, Friedman, Conwell, & Fiscella, 2007).

The U.S. Department of Veterans Affairs (VA) is the largest healthcare delivery system in the U.S. with approximately eight million veterans enrolled at the end of the 2009 fiscal year (Department of Veterans Affairs, 2009; Perlin, Kolodner, & Roswell, 2004; Veterans Health Administration, 2010). Recognizing depression screening as best

practice, the VA mandates annual depression screening in the primary care clinics once for all veterans evaluated (Kirkcaldy & Tynes, 2006; Oslin et al., 2005). Moreover, the VA has a statutory mission to conduct research to enhance the health of veterans as well as the health of the nation (Francis & Perlin, 2006). One of the means to recognize and treat depressive disorders in the VA is the Patient Health Questionnaire-2 (PHQ-2) (Dobscha, Corson, & Gerrity, 2007; Perlin et al., 2004). Annually, all veterans treated in the VA healthcare are assessed for depression by use of the PHQ-2. This tool recognizes the most important first steps of diagnosing depression; inquiry about depressed mood and anhedonia over the past two weeks (Mulrow et al., 1995; Whooley, Avis, Miranda, & Bowner, 1997).

Given the known prevalence and associated comorbidities of depression in the general population, the purposes of this study were to determine the prevalence of depression in a veteran's hospital system in the Southeastern section of the United States as measured by the PHQ-2, and to create a model for predicting depression based upon these results and associated variables.

CHAPTER II

RESEARCH PROBLEM

The Department of Veterans Affairs (VA) is the largest health care delivery system in the United States with approximately eight million veterans enrolled at the end of the 2009 fiscal year (Department of Veterans Affairs, 2009; Perlin et al., 2004; Veterans Health Administration, 2010). Of the many conditions a primary care provider diagnose and treats, depression may be one of the most challenging. Patients experiencing depression often seek care from their primary care providers before presenting to a mental health provider (Saver et al., 2007).

Depression is one of the most prevalent and treatable mental disorders seen by health care providers (Whooley, Avis, Miranda, & Bowner, 1997). Therefore, failure to recognize depression, thereby leaving it untreated can potentially increase mortality (Egede, 2007). The diagnosis of depression often occurs in the primary care clinic (Williams et al., 2000); and, according the Veterans Affairs (VA) Mental Health Quality Enhancement Research Initiative [QUERI] (2008), major depression is currently the leading cause of disability in the United States and is projected to be the leading cause of worldwide disability by 2020.

Approximately one of every three veterans visiting primary care has symptoms of depression, with one in eight requiring medications or psychotherapy (Rubeinstein, Chaney, Williams, & Gerrity, 2004). Cully, Zimmer, Khan, and Petersen's (2008) findings indicate that less than half (48%) of the veterans with newly diagnosed depression receive high-quality treatment. The Veterans Health Administration (VHA)

database was used to identify 205,165 veterans with a new onset of depression. The VHA data are stored with The National Patient Care Database (NPCD). The NPCD data warehouse stores all clinical information and is updated daily. NPCD records include data such as patient demographics, date and time of appointments or other services, the practitioner who provided the services, and the location where the services were provided. This data warehouse also stores information on diagnosis, such as depression, procedures, and the veteran's global assessment of functions (GAF).

The VA has a statutory mission to conduct research to enhance the health of veterans as well as the health of the nation (Francis & Perlin, 2006). In addressing the diagnosis and management of psychiatric disorders, The U.S. Department of Veterans Affairs (V.A.) mandated annual depression screening at V.A. primary care clinics at least annually (Kirkcaldy & Tynes, 2006; Oslin et al., 2005). One of the mandatory tools is the Patient Health Questionnaire (PHQ-2). The tracking of the depression screening is through a clinical reminder which automatically displays when entering the veteran's electronic chart. The clinical reminder prompts to the providers that a depression screening is to be completed (Oslin et al., 2005). The computerized patient record system (CPRS) gives an alert on the screen in a text box highlighted in the electronic medical records (Kirkcaldy & Tynes, 2006) records system, CPRS, which also prompts the providers to complete screening. The two-item Patient Health Questionnaire (PHQ-2) tool, is often completed prior to the clinic encounter with the physician or nurse practitioner either by a health tech or licensed practical nurse (LPN) during the veteran's primary care visit (Department of Veterans Affairs, 2009). The results of the PHQ-2 can

be as simple as *Screen is Positive*, but does not inform about the evaluation, treatment, and long-term management processes that follow a positive screening.

Managers within the VA are held accountable for reaching the established targets in the evidence-based measures of quality. The southeastern VA involved in this study is currently meeting the performance measure at 100%. This means that all veterans entering the VA health care system are screened for depression at least annually as stipulated by federal mandates. Once the patient is seen by the physician or the nurse practitioner, it is that provider's responsibility to assure the screening tool was complete and to address if positive.

In the primary care setting, problems with the diagnosis of depression may occur because patients do not present with easily identifiable symptoms or have multiple medical and mental health comorbidities which compete for clinical attention (Klinkman, 2003). Diagnosing problems includes lack of knowledge about mental illness and limited mental health services in the clinic. Limited services may mean that individuals with mental illness are left untreated and their symptoms may worsen (Kanapaux, 2004).

Primary care physicians have evidence-based guidelines to direct treatment of major depression (Williams et al., 2000); and, although there have been increases in diagnosing depression over the last 10 years, the majority of those with a mental disorder still do not receive treatment (Keesler et al., 2005). There may be missed opportunities in primary care to refer patients directly for mental health services (Thomas, 2010). Poor primary care provider detection of depression is a major barrier to providing appropriate care. The severity of the depression symptoms contribute to how the primary care

providers respond. The detection of depression among patients with serious symptoms is more often recognized than those with milder symptoms (Borowsky et al., 2000).

The underdiagnosis and overdiagnosis of depression can result in inadequate treatment. Many times the underdiagnoses are due to patients presenting with symptoms that could indicate depression but are too ashamed to discuss their psychological problems. There are also times when the family physicians have difficulty asking the questions to illicit the possible psychological symptoms related to the lack of knowing how to introduce depression to the patient. The introduction of depression could explain some of the patient's physical symptoms (Argones, Pinol, & Labad, 2006; Phelan et al., 2010).

The patient's unwillingness to seek help for their symptoms is a major barrier to depression recognition. The unwillingness to seek and accept help varies depending on factors such as age, culture, upbringing and belief systems. Saver's et al. (2007) qualitative study revealed that shame, feelings of guilt and embarrassment about depression hindered participants from discussing their depressed mood.

The National Alliance of Mental Illness (NAMI) offers that many older people do not recognize the symptoms of depression, are not aware of it as a medical illness, and do not know how it is treated. In addition, with the stigma associated with mental illness, the older person may also blame themselves for the illness and are too ashamed to seek help from a professional (Jeste, 2003).

Clearly, depression is a major problem in our society that is escalating. Along with that, it is more prevalent in the elderly population which is increasing exponentially.

While the VA system has mechanisms in place to detect depression, needed are proactive methods to predict depression. The assumption is that if it can be predicted, it can be controlled, and if it can be controlled, it can be predicted. Also known is that the VA population represents an increasingly elderly population.

Purpose of the Study

The Veteran's Health Administration/Department of Defense (VHA/DoD) has published clinical practice guidelines for the management of major depression disorder (MDD). The clinical guidelines divide treatment into three components: diagnostic evaluation, acute treatment and long-term management. The guidelines were designed to provide information to assist the clinical provider in decision making (Management of MDD Working Group, 2009). The VA's performance measures are linked specifically to the guidelines developed in collaboration with the DoD (Francis & Perlin, 2006). These performance measures are constructed to determine if the particular medical center is compliant with evidence-based clinical guidelines focusing on preventative medicine, disease treatment and palliative care. From measures presently institutionalized in the VA, mechanisms are already in place to identify depression with mandatory annual depression screening utilizing the PHQ-2. Therefore, the proposed research seeks to use the results of positive PHQ-2s to predict depression. The assumption is that if a model can be generated to predict those at risk for depression, then preventative strategies can be derived which can reduce both the incidence and severity of those at risk and/or who are experiencing depression.

Hence, the purposes of this study were to determine the prevalence of depression in a veteran's hospital system in the southeastern section of the United States as measured by the PHQ-2, and to create a model for predicting depression based upon these results and associated variables. The associated variables were biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management) factors.

Research Questions

The guiding research questions for this study were (a) what is the prevalence of depression in a VA hospital in the Southeastern part of the United States in a one year period as measured by positive results of the PHQ-2 and (b) to what extent do the associated biological, sociological, and environmental variables predict depression in veterans with a positive PHQ-2.

Hypotheses

For this study, three hypotheses were derived for the two questions. First it was hypothesized that a positive PHQ-2 score would positively correlate with a measure of biological factors of age, race, gender, body mass index, and medical comorbidities in predicting depression in the veterans. Secondly, a positive PHQ-2 would positively correlate with a measure of sociological factors of marital status, employment status,

service connection percentage and category, and branch of service in predicting depression in the veteran population. The final hypothesis was that a positive PHQ-2 would be positively correlated with a measure of environmental factors of veterans being a smoker or not; being physical activity; and being referred to the MOVE!® program for weight loss/management.

Theoretical Framework

Donabedian's (2003) Quality of Care Evaluation Model provided part of the theoretical underpinning for this study. To incorporate the human factors and responses to depression, a segment of Shaver's (1985) *Biopsychosocial View of Human Health* was also incorporated. Shaver's framework is useful in identifying gaps in the literature related to links between depression and biopsychosocial factors. Note that behavioral components of Shaver's model were not included as the data base used for the study did not include the behavioral factors. With the remaining components, this research was anticipated to predict the influence of the selected factors on depression using the PHQ-2 as an assessment tool. At the practice clinical and practical levels, the model guided the study. While the PHQ-2 is reliable for diagnosing depression, this research purposed to go a step further and determine if other biopsychosocial variables coupled with results of a positive PHQ-2 could be used to create a predictive model for depression.

Donabedian's model has three components: structure of care, process of care and outcomes of care. The structure will be verified by utilization of data from a system in place to identify veterans who are diagnosed as depressed by the extent to which veterans seen over a one year period have had PHQ-2 screening. The process for alerting

practitioners of veteran's positive PHQ-2s will be verified, and last, the outcome is confirmed by the prevalence of veterans with positive PHQ-2s identified by the institutional system in place mandating yearly depression screening and the follow through with the process.

Donabedian and Shaver both discuss interactive and interpersonal relationships respectively. The blended models combine the structure, process and outcomes of identifying depression by use of the PHQ-2 with psychosocial variables of Shaver to effectively identify and ultimately predict depression in the veteran population. Through integrating the Donabedian (2003) and Shaver (1985) models (Figure 1), the Veterans Administration may be able to identify clients at risk for depression at earlier stages and those whose symptoms are at an earlier level.

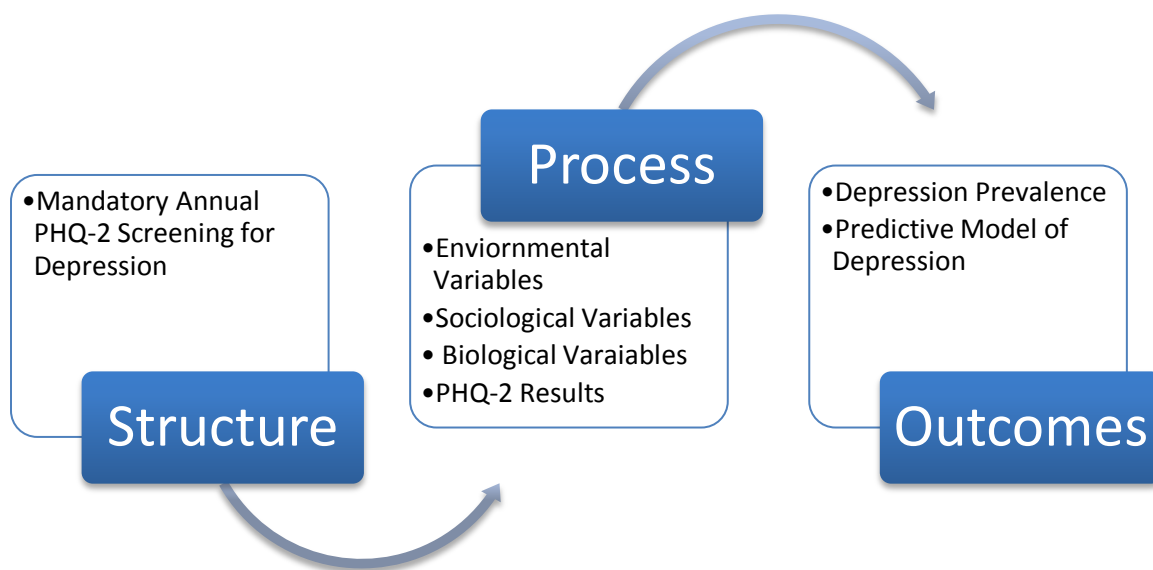


Figure 1. Model of Early Recognition and Predictive Depression.

Operational Definitions

For the purposes of this study, terms were defined in the following manner:

- a. Computerized patient record system (CPRS) - (operational) automated information system containing patient's electronic medical records.
- b. Depression (operational) - for the purpose of this study five or more of the major depression criteria (Appendix B) must be identified.
- c. PHQ-2(operational) - a 2 question screening instrument designed to quickly detect depression and to measure the prevalence (Appendix A). The two questions are based on the following prompt:

Over the past two weeks, how often have you been bothered by any of the following:

Little interest or pleasure in doing things

Feeling down, depressed, or hopeless

- d. Screening (operational) - completion of the two question PHQ-2 and document in the clinical reminder.
- e. Treatment management (operational) - further actions were taken if the PHQ-2 is positive. Screening with the PHQ-2 is only a first step. Patients who screen positive (score four to six) should be further evaluated with the PHQ-9, other diagnostic instruments, or direct interview to determine whether they meet criteria for a depressive disorder (Kroenke, Spitzer & Williams, 2003).

Treatment could include monitoring, medications, psychotherapy or a combination.

- f. Biological, social and environmental factors - factors existing along a continuum that are complex and can help to understand health, illness and health care delivery. According to the Center for Disease Control [CDC] (2012), the social, environment and biological factors are complex, integrated and overlap within the health care system. For this study, the determinants of health influencing one's health status are individualized and operational as follow:
 - a. Biological (age, race, gender, body mass index, and medical comorbidities)
 - b. Social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service, and military status)
 - c. Environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management)
- g. MOVE!® - a national weight management program to help veterans lose weight, keep it off and improve their overall health. The VA has been mandated to either initiate the MOVE!® program designed by the VHA National Center for Health Promotion and Disease Prevention (NCP) or an alternative weight management program for the veterans. The veterans are

referred for evaluation by their primary care provider. Through the program, the veterans are offered group and individual support, record their food intake and calculate calories on the United State Department of Agriculture's (USDA's) MyPyramid Tracker tool (USDA, 2011).

Theoretical Definitions

- a. PHQ-2 (theoretical) - a tool asking two questions about mood and anhedonia. For each of the items, the response options are *not at all*, *several days*, *more than half the days*, and *nearly every day*, scored as 0, 1, 2, and 3, respectively.
- b. Positive PHQ-2 (theoretical) - The score on the PHQ-2 can range from 0 to 6. A score of 4 to 6 points is positive with a sensitivity of 83% and a specificity of 92% for major depressive episodes (Kroenke et al., 2003).
- c. Depression (theoretical) an unipolar mood disorder characterized by physical and psychological symptoms that cause significant distress and impairment in functioning and occur in the absence of elevated mood (mania or hypomania) as identified by Uphold and Graham (2003):
 - Depressed mood or marked decrease pleasure in most activities lasting more than two weeks
 - Depressed mood for most of the day, for more days than not, for at least two weeks
 - Presence of fewer than five symptoms of major depressive disorder
- d. Primary care provider (theoretical) - a licensed independent provider who provider, coordinates and is the principal person responsible for the services to

the veterans enrolled in the primary care clinic. This includes family physicians, nurse practitioners or physician assistants.

- e. Means Test/Enrollment Priority Group - criteria used to determine the eligibility for comprehensive medical benefits for the enrolled Veterans (Appendix D).
- f. VA Income Threshold - the income used to determine the amount a veteran will be charged if care provided is not for a service connected condition (Appendix E).
- g. Service Connected - a condition was either caused or aggravated by military service or as a result of an existing service connected disability.

Limitations

1. The use of a convenience sample. All positive PHQ-2 for one year were used.
2. Data were as accurate as recorded in charts.
3. The study was set in the VA and uses primarily a mostly all male veteran population.
4. The subjects were from a single VA facility in the southeastern part of the United States, therefore limiting generalizability.
5. The electronic records might be inaccurate/incomplete; therefore there may have been limitation in the validity of the findings.
6. The level of comorbidity in the sample might limit generalizability to other population.

7. Data were collected by the researcher only. Human error in data entry or in interpretation of writing information could have impacted the results of the study.
8. Patients may have denied symptoms due to the stigma of being diagnosed with a mental illness.
9. The severity of the depression or documents signs and symptoms may have been difficult to determine from the documentation.

Significance of the Study

Primary care providers are generally the first to come into contact with the patient when the patient has concerns or health challenges. Of the many conditions a primary care provider diagnose and treat, depression may be one of the most challenging (Saver et al., 2007) while being one of the most prevalent and treatable mental disorders (Whooley et al., 1997). However, failure to recognize and treat this condition will increase mortality (Egede, 2007). Depression, if untreated, can result in dire consequences, the extreme of which is suicide. Up to 75% of older adults who died by suicide had visited a primary care provider within a month of the suicide. Data from the Department of Veterans Affairs (2011) identified an approximate vulnerability to suicide for the veteran population at 30,000 - 32,000 annually, with 11% attempting suicide within 90 days of the last visit. Smith, Craig, Ganoczy, Walters, and Valenstein (2011) obtained service and pharmacy data from 1,843 veterans who died from suicide and had been diagnosed with depressive disorder from April 1999 to September 2004. The majority of the veterans, 43%, had visits with mental health services within 30 days of their death. Fifty-seven per

cent of those seen with 30 days were seen in non-mental health settings. In evaluating the 57% seen in a non-mental health setting, only 34% had a mental health diagnosis coded on that last visit and adequate dosages were only prescribed in 41%. These findings demonstrate the urgency of improving the recognition, treatment and management of depression (National Institute of Mental Health, 2003).

Primary care physicians have evidence-based guidelines to direct treating major depression (Williams et al., 2000). Although there have been improvement diagnosing and treating major depression over the last 10 years, the majority of those with a mental disorder still do not receive treatment (Keesler et al., 2005). There may be missed opportunities in primary care to refer patients directly for mental health services (Thomas, 2010; Wittkamp, Naeije, Schene, Huyser, & Van-Weert, 2007). The physicians and nurse practitioners may recognize obvious signs or symptoms, but if they are not looking for subtle signs of depression, or if they are not considering depression as a differential diagnosis, an opportunity for intervention may be delayed or lost. With the patients often seeking care from their primary care providers before presenting to a mental health provider (Saver et. al., 2007), successful management of depression includes overcoming both recognition and diagnosis barriers.

According to Kanapaux (2004), most primary care physicians have not been trained on how to use the most recently introduced antidepressants in the elderly. Since the first line of diagnosis is often the primary care provider, this person should be aware of signs and symptoms of mental illness. It is this lack of recognition, diagnosis and

treatment of depression which Kanapaux contributes to the physician's lack of confidence in treating the elderly person.

The underdiagnoses and overdiagnosis of depression results in inadequate treatment. Many times the underdiagnoses are due to patients presenting with symptoms that could indicate depression but are too ashamed to discuss their psychological problems. There are also times when the family physicians have difficulty asking the questions to illicit the possible psychological symptoms related to the lack of knowing how to introduce depression to the patient. The introduction of depression could explain some of the patient's physical symptoms (Argones et al., 2006; Phelan et al., 2010).

Mavandadi et al. (2007) discussed a study conducted in a Veterans Affairs Medical Center primary care clinic. In the primary care setting, the researcher identified the pain as one of the physical factors interfering with normal work activities and worsening depressive symptoms over time in the older adults. Baseline data were collected from 2,022 participants. The final sample size was 524 male VA patients diagnosed with major depression, dysthymia, depression not otherwise specified, or minor depression. With the exception of major depression, the results indicated no significant difference between the two sample groups. Mavandadi et al. (2007) confirmed the importance of the detection, diagnosis and management of depression, especially in the older population. They warn that pain and other forms of comorbidity may complicate the management of depression.

Although not the focus of the study, it is imperative to determine the extent to which providers detect, treat and follow-up patient with depression, as the

aforementioned literature documents. Early identification, as was the goal of the model, is anticipated to reduce the delay in treatment and progression of symptoms of depression in a southeastern VA population.

The concern with the impact of depression on the veterans involves health promotion. The literature was replete with concerns of the under documentation and recognition of depression (Argones et al., 2006; Phelan et al., 2010). Lastly, nurse practitioners often integrate nursing and medical models in their daily practice; therefore, with the use of a predictive model of depression, the nurse and other providers would be able to plan and integrate strategies to identify clients at risk for depression or those in the earlier stages. The predictive model possibly has the potential to equip nurse practitioners and other providers with a tool in which to identify clients perhaps before results are documented by the PHQ-2.

CHAPTER III

REVIEW OF LITERATURE

Depression is one of the most common problems seen in the primary care clinics (Saver et al., 2007) costing the United States approximately \$30 - 44 billion annually (Gonzalez et al., 2010). This chapter has included a discussion of relevant literature associated with the purposes of the study. Limitations for the review included a date range of 2007 to current and literature specifically addressing the veteran population, with the exception of the review of depression in the general population. The purposes of this study were to determine the prevalence of depression in a veteran hospital in the southeastern section of the United States as measured by the Patient Health Questionnaire-2 Questions (PHQ-2), and to create a model for predicting depression based upon these results and associated variables: biological (age, gender, race, body mass index (BMI), medical comorbidities), social factors (marital status, service connection percentage and category, education, socioeconomic status based on the means test category, insurance coverage), and environmental (employment, military status and branch of service, smoker or non-smoker, if physical activity was documented, and referral to the MOVE!® program for weight loss/management).

Five major research literature sections are presented. Beginning with an overview of depression and identifying the incidence and risk factors for depressive disorders, the first section will include prevalence studies regarding depression in the veteran population. The second section includes studies on the recognition, current guidelines for diagnosing depression and treatment of depression in the primary care clinics. Thirdly,

the focus turned to the dependent variable for this study, the PHQ-2, as it was used in primary care to measure depression in the veteran population. The fourth section addressed the independent variables identified for this study. To conclude, the sixth section addressed suicide in the depressed veteran population.

Prevalence of Depression in the Veterans

It is estimated by the World Health Organization (WHO) (2010) up to 340 million individuals worldwide will experience depression at some point in their life. Clearly, depression is a major problem in our society and is more prevalent in the elderly population which is increasing exponentially. At the end of the 2009 fiscal year, over 37% of the veteran population was age 65 years old or older. There is a projected increase of veterans age 65 to 84 between 2010 and 2015 (Department of Veterans Affairs, 2009). Whereas, in the general population, the prevalence of major depression is generally lower in the older adults than the younger adults (Chapman & Perry, 2008).

The VA, the largest integrated health care system in the U.S. (Department of Veterans Affairs, 2009), and according the VA Mental Health Quality Enhancement Research Initiative [QUERI] (2008), major depression is projected to become the leading cause of worldwide disability by 2020. Approximately one of every three veterans visiting primary care has symptoms of depression, with one in eight requiring medications or psychotherapy (Rubeinstei et al., 2004). Cully et al. (2008) present findings indicating that less than half (48%) of the veterans with newly diagnosed depression receive high-quality treatment. The Veterans Health Administration (VHA) database was used to identify 205,165 veterans with a new onset of depression. Liu et al.

(2009) recommends using the evidence-based quality improvement approach (EBQI) to introduce evidence based depression care into the already staffed organizations.

According to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, Text Revision [DSMV-IV-TR] (American Psychiatric Association, 2000), depression nonpsychotic in nature is a single episode or recurrent and is given if the individual goes through a major depressive episode for at least two week and the individual must experience either depressed mood or anhedonia for that time frame. Other symptoms are indicated and the individual must display at least four out of the seven remaining symptoms; weight changes, sleep disturbance, psychomotor agitation or retardation, fatigue or loss of energy, difficulty concentrating, feelings of worthlessness or hopelessness, and suicidal ideations. These symptoms must also cause clinically significant distress or impairment in areas of daily function. A diagnosis of depression is not confirmed if any other mental or medical disorder or substance use, legal or illegal, may be the contributing factor (Appendix B).

To address the increase in depression, The U.S. Department of Veterans Affairs (VA) has mandated annual depression screening at VA primary care clinics. To determine if the measures are being performed, there is performance measures linked specifically to the guidelines developed in collaboration with the Department of Defense (Francis & Perlin, 2006). To provide the best care for the veteran, health care providers will need a veteran-specific body of knowledge (Hobbs, 2008). This knowledge will help them to properly assess, diagnose and manage each individual veteran.

Of the many conditions a primary care provider diagnoses and treats, depression may be one of the most challenging. Patients often seek care from their primary care providers before presenting to a mental health provider (Saver et al., 2007). Primary care physicians have evidence-based guidelines to direct treating major depression (Williams et al., 2000) and although there have been increases over the last 10 years, the majority of those with a mental disorder still do not receive treatment (Keesler et al., 2005). There may be missed opportunities in primary care to refer patients directly for mental health services (Thomas, 2010). Poor primary care provider detection of depression is a major barrier to providing appropriate care. The severity of the depression symptoms contribute to how the primary care providers respond. The detection of depression among patients with serious symptoms is more often recognized than those with milder symptoms (Borowsky et al., 2000).

Demographics of Depressed Veterans

Using the 2002 fiscal year data from VHA's National Patient Care Database (NPCD), Frayne et al. (2007) reminded the health care system that more women were entering the Veterans Health Administration system. Women make up approximately 14.3% of the active duty U.S. military, 17.7% of the reserve and 15.1% in the National Guard. Currently approximately 8% of U.S. military veterans are women (Department of Veterans Affairs, 2011; Office of Policy and Planning, 2007). The average age of the women veterans in 2009 was 48 years, compared to 46 for non-veteran women. Also, in 2009, 19% of the women veterans were Black and more likely to be married than non-veterans (Department of Veterans Affairs, 2009).

Women were not often represented in the research and when included, their numbers were not as significant as the men veterans. Maguen, Ren, Bosch, Mamar, and Seal (2010) examined the gender differences in sociodemographic, military service and mental health characteristics among the veterans serving in Operation Enduring Freedom and Operation Iraq Freedom. In comparing age and race, the female veterans were young and more likely to be Black and diagnosed with depression; whereas the men were more likely to be diagnosed with post-traumatic stress disorder (PTSD) and alcohol use. As the age progressed, there was a prevalence of depression and PTSD among the women.

Frayne et al. (2007) compared utilization and cost for the veterans. In their cross-sectional study, women were found to use more outpatient encounters and fewer inpatient days, and thereby experiencing a lower total cost. Variables applied to the study were gender, utilization, as they relate to age, race, and marital status. During the 2000 fiscal year, women were younger than men and the women were more likely than men to be unmarried and have a mental health diagnosis. The findings of this cross-sectional study revealed that women had 11.8% more outpatient encounters and 25.9% fewer inpatient days than men. The conclusion was for the VA healthcare system to build up to meet the needs of the women veterans as they are becoming prominent in both medical and mental health.

Recognition and Treatment of Depression in Primary Care

Depression is one of the most prevalent and treatable mental disorders seen by health care provider (Whooley et al., 1997) and failure to recognize it increases the risk for mortality (Egede, 2007). Primary care physicians have evidence-based guidelines to

direct treating major depression (Williams et al., 2000) and although there have been increases in diagnosing and treating depression the last 10 years, the majority of those with a mental disorder still do not receive treatment (Kessler et al., 2005). There may be missed opportunities in primary care to refer patients directly for mental health services (Thomas, 2010; Wittkamp et al., 2007).

The underdiagnoses and overdiagnosis of depression results in inadequate treatment. Many times the underdiagnoses are due to patients presenting with symptoms that could indicate depression but they are too ashamed to discuss their psychological problems. There are also times when the family physicians may have difficulty asking the questions to illicit the possible psychological symptoms related to the lack of knowing how to introduce depression to the patient. The introduction of depression could explain some of the patient's physical symptoms (Phelan et al., 2010).

Bluestein and Cubic (2009) offer an opportunity for both the psychologist and the primary care clinic to benefit for the new integrated models. The authors discuss how most educational programs have not modified their curriculum to prepare the psychologist for the diverse practices in the health care delivery system. The psychologist also tends not to seek any additional training to improve certain areas. Bluestein and Cubic discuss the importance of the two providers, primary care and psychologist, partnering to create a successful integrated system. The overlap between medical and mental health issues can easily interfere with the primary care provider's ability to manage presenting medical symptoms. Through the partnership, it is expected that the

behavioral health provider's mode will offer the psychologist a chance to improve their practice while allowing the primary care provider to focus on the medical aspect.

Older adults, age 65 and older, offer a different challenge for the caregiver when evaluating depressive symptoms secondary to the possible overlap of comorbid symptoms like insomnia (Lawhorne, 2005). In this case, the office staff may erroneously equate the presentation with feelings of loneliness or fear (Phelan et al., 2010). To rule out a medical diagnosis and explore the possibility of a mental health disorder may be too time consuming. However, a brief screening tool like the PHQ-2 can help to accurately identify depression among the elderly (Phelan et al., 2010).

Poor primary care provider detection of depression is a major barrier to providing appropriate care. The severity of the depression symptoms contribute to how the primary care providers respond. The detection of depression among patients with serious symptoms is more often recognized than those with milder symptoms (Borowsky et al., 2000).

Late-life depression in people 65 and older is a common recurrent illness that often goes unrecognized or under treated. A diagnosis of major depression is noted in 2% to 4% of elderly living in the community, 10% to 12% of hospitalized elderly, 6% to 9% of those seen in primary care clinics and 12% to 14% of elderly in the nursing home setting (Rajji, Mulsant, Lotrich, Lokker, & Reynolds, 2008).

According to Reynolds, Cruz, Teh, and Rollman (2005) the older population often present with such common medical conditions as hypertension, diabetes, cardiovascular

disease, osteoarthritis, and neurodegenerative disorders, which account of 20% to 40% of the 6% to 10% of the older patients presenting to the primary care setting.

Unutzer et al. (2003) conducted a cross sectional survey among 1,801 depressed older adults being evaluated in 18 primary care clinics. The inclusion criteria were a patient who had received at least two months of treatment inclusive of prescription medication, counseling, or psychotherapy for depression at any time in their life. Results indicated significant higher rate of lifetime and recent depression care based on sex, race, two or more prior depressive episodes, chronic pain, and treatment preferences. Of those participating, patients preferring antidepressant medications reported the highest rate of depression care. It was found that lifetime or recent depression treatment was less likely reported in men than in women. The study was significant in demonstrating the feasibility of medication and psychotherapy in treating a depression in a wide range of primary care practices.

In a randomized, controlled trial Dobscha et al. (2007) identified the results of a collaborative depression intervention trial. The veterans were offered different treatment options, antidepressants alone were offered to all the veterans. Other choices included individual counseling, antidepressant plus individual counseling, group counseling and watchful waiting. The choice of antidepressant medications alone were selected in 32% of the 314 patients in the study. Individual counseling (19%) and antidepressants and group therapy (18%) were included in the preference. Group therapy was selected in 7% of the enrollees and those enrollees were described as being more depressed than the other preference groups. The treatment preferences were associated with baseline PHQ

depression severity scores ranging from 10-20, which is indicative of moderate-to-severe depression. Based on the results, there were no significant associations between the veteran's preference of treatment and a change in their PHQ depression severity.

Recognition of depression can be impacted by the patient often reporting unclear symptoms that could be indicative of other diagnoses (Baik, Bowers, Oakley, & Susman, 2005). Clinicians often engage three primary processes to recognize depression; ruling out, opening the door and recognizing the person, and three conditions; familiarity with the patient, general clinical experience and time availability. The assessment from the three processes and the three conditions collaboratively contributes to the next steps the practitioner will take in treating the depression, if indicated. The overall success of the accurate and timely diagnosing of depression is highly influenced but the three identified conditions. Baik et al. (2005) implemented the grounded theory method to guide the sample, data collection and data analysis to identify the three processes and conditions of depression diagnosis. The authors conducted face-to-face interviews with eight primary care clinicians in three primary care settings.

Sorting through the symptoms was the clinician's method determining if depression was present. Even when depression was suspected, they still considered a broad range of other possibilities. Depression diagnosis may also be delayed if the patient decides not to share the highly personal information often required for diagnosis. Thus opening the door practice allowed the patients the opportunity to share this information. Familiarity with the patient could also impact depression recognition (Baik et al., 2005). According to Baik et al. (2010), the clinician's familiarity with the patient facilitated

depression recognition and eliminated the need for unnecessary evaluation to rule out physical illnesses. The clinician also reported recognizing depression based on the patient's behavioral body language.

According to Gahm and Lucenko (2008), for veterans being evaluated in multiple clinics or multiple programs for behavior health, there is often a lack of communication between provider as evidenced by delay in sharing patient related data or reports. As a result, the soldier is responsible for sharing the information across specialties. This procedure may result in an unnecessary burden and an added stressor. Consistent and standardized screening procedures are identified by the author as a way of supporting the patient and providing quality, consistent care.

Using screening tools recommended by Gahm and Lucenko, researchers Abed-Faghri, Boisvert, and Faghri (2010), presented results of a study which reviewed the practice habits of the physicians in use of a structured psychiatric assessment tool. Many of those in the study, 77.5%, relied mostly on their traditional clinical interview to diagnose and treat psychiatric problems. Although they were willing to use the structured psychiatric assessment tool, traditional clinical interviewing was their primary method of psychiatric assessment and treatment.

Contributing factors to depression can include, but not limited to, genetic influences, hormonal responses to stresses, response to acute or chronic illness, or psychological or social factors. Although there have been increases in diagnosis of depression over the last 10 years, the majority of those diagnosed with a mental disorder still do not receive treatment (Keesler et al., 2005). The treatment includes medication,

psychotherapy, and electroconvulsive therapy (ECT) (NAMI, 2006). In the primary care setting, treatment often includes medication as well. Selective serotonin reuptake inhibitors (SSRIs) are the most commonly prescribed treatment followed by tricyclic antidepressants at 22% (Unutzer et al., 2003). One of the means to evaluate and assist with the diagnosis, screening tools is sometimes administered but positive results does not always mean treatment is initiated. This can be seen in a study conducted the New Orleans V.A. Medical Center (Kirkcaldy & Tynes, 2006).

The V.A. Medical Center, New Orleans, evaluated their screening method in their Primary Care in Internal Medicine (PRIME) clinic. The providers in the clinic included nurse practitioners, internal medicine house-staff, and internal medicine attending physicians. The patients were screened during the month of January 2002 and results were documented into the Computerized Patient Record System (CPRS). The researchers then reviewed their previous 12 month visit to see if the screening was performed and if positive, were they offered at least one treatment modality or psychiatric referral. Of the 1,100 patients visiting the clinic that month, 1,068 (97%) were screened either January 2002 or in the previous 12 months. Eight percent of the 1068 screened reported they were already receiving treatment for depression at time of screening. Seven percent (7%) screened positive and half of these were offered at least one intervention. The clinic found that regular screening was a value for basic management of positive depression screens. The 97% screening was commendable, however the frequency of follow-through on the positive screens were not. Approximately one-third of those screened positive did not receive basic depression management (Kirkcaldy & Tynes, 2006).

Cognitive Behavioral Therapy is problem solving treatment approach with the primary focus of symptom reduction (Stuart & Laraia, 1998) . Laidlaw et al. (2008) offers an empirical evaluation of the use of Cognitive Behavior Therapy (CBT) alone versus treatment as usual (TAU) alone in treating depression later in life. For this student, the TAU was generally pharmacotherapy. The 44 participants, each diagnosed with mild to moderate major depression, were randomly assigned to one of the two treatment groups. Those participating in the cognitive element were trained to monitor self-monitor their negative thinking to help effectively challenge the thoughts thus encouraging symptom relief. During the study, four of the participants were initiated on medications by their general practitioner. Each of the four continued in the study but their results were not included in the analysis. To ensure the therapist was following the established protocols, sessions were randomly audiotaped for review by an independent experienced cognitive therapist.

The TAU was carried out by independent general practitioners not directly involved with the study. Depending on what the general practitioner consider appropriate, treatment could also mean no treatment. To eliminate the influence on the decision to treat or not treat, the general practitioners were not asked about the terms of their decision for TAU. Information was assessed by reviewing the general practitioners note at the end of the study and asking the participants. Laidlaw et al.'s (2008) study is identified as the first comparing CBT alone and TAU alone in a primary care setting. The results demonstrated benefits in both groups with lower scores on the measures used to evaluate their mood at the beginning of the study (Laidlaw et al., 2008).

Mohr, Carmody, Erickson, Jin and Leader (2011) performed a study offering telephone-administered cognitive behavioral therapy (T-CBT) for 85 veterans meeting the DSM-IV diagnosis for depression. The veterans, diagnosed with major depression, were randomized to the T-CBT group or the treatment as usual (TAU). Each group received 16 sessions over 20 weeks. The PHQ-9 as one of the tools administered to monitor treatment. The trial was not a success. The veteran's symptoms did not improve from baseline, to Week 20. There was also a six month follow-up and there were no significant difference from the baseline with either.

In a randomized, controlled trial Dobscha et al. (2007) identified the results of a collaborative depression intervention trial. The veterans were offered different treatment options, antidepressants alone were offered to all the veterans. Other choices included individual counseling, antidepressant plus individual counseling, group counseling and watchful waiting. The choice of antidepressant medications alone were selected in 32% of the 314 patients in the study. Individual counseling (19%) and antidepressants and group therapy (18%) were included in the preference. Group therapy was selected in 7% of the enrollees and those enrollees were described as being more depressed than the other preference groups. The treatment preferences were associated with baseline PHQ depression severity scores ranging from 10-20, which is indicative of moderate-to-severe depression. Based on the results, there were no significant associations between the veteran's preference of treatment and a change in their PHQ depression severity.

The most recent form of treatment for the veterans is in the form of a medical home model: The Patient-Centered Medical Home (PCMH) (Pomerantz & Sayers,

2010a; Shay & Schectman, 2010; Tew, Klaus, & Oslin, 2010). This new mental health integration program is designed to incorporate new evidence-based treatments as the patients demographics evolve over time. This model is currently implemented in 20 Veterans Affairs facilities. The overall model allows for the patient-provider interaction to be more coordinated and comprehensive and the primary care provider (PC) will not be solely responsible for the care of the veteran but a member of a team designed for collaborative interdisciplinary management. The overall program is called the Behavioral Health Laboratory (BHL) and will use standardized soft-ware-aided mental health assessments, along with clinical manager, to deliver the evidence-based treatments to the veterans. Depression is one of the disorders being managed (Tew et al., 2010).

There are five components to the BHL system beginning with patient identification. This is a screening process similar to case-finding and is designed to identify cases early and intervene while the symptoms are in their milder form. Correctly identifying the patient in this initial phase will be imperative to the success of the remaining four core components: Virtual clinics and telephone-based assessments, evidenced-based protocols to educate the patient, reliance of the primary care provider and finally interventions that are time-limited.

During the identification phase, the PHQ is one of the tools administered over the telephone usually within a few days of the referral. At the end of the call, the software program will automatically generate a note to be added to the electronic medical records. The remainder of the care provided to the patient is dictated by platforms of treatments.

These pathways are built into the program and are all built on evidence based treatment recommendations (Tew et al., 2010).

A few of the Veteran Affairs are implementing behavior health providers (BPH) assigned to the primary care clinics, and has a partial role similar to a member of the BHL team. This mental health professional will be integrated into the primary care clinic to help the primary care provider (PCP) identify and treat behavioral issues within the primary care setting (Funderburk et al., 2010; Funderburk et al., 2011; Post, Metzger, Dumas, & Lehmann, 2010). At some of the facilities, this BPH for their integrated primary care model is a psychologist. The role of the psychologist is to assist the PCP as well as assist the veteran with readjusting to civilian life. There interventions are to be brief and if long-term is needed, they would be referred to a mental health provider (Maguen, Cohen, Cohen, Lawhon, Marmar, & Seal, 2010). Following the same principles but a different name, another Veterans Administration called their integration a Collaborative Care Clinic where this is the access point for primary care mental health patients (Pomerantz et al., 2010b). There are some Veterans Administrations who plan on offering a blended behavioral healthcare model as the more the topic is discussed the more it sounds like a modified case management model (Hunter & Goodie, 2010).

Gallo et al. (2007) completed a randomized controlled trial testing if an intervention of algorithm-based care would improve depression and modify the mortality rates. A total of 1,226 randomly selected patients from twenty primary care practices based in New York, New York and Philadelphia and Pittsburgh Pennsylvania was observed. The measurement included a depression status at baseline using a five year

interval from the National Death Index. The baseline included 396 patients meeting the criteria for major depression and 203 for minor depression. The data was collected from the Prevention of Suicide in Primary Care Elderly: Collaborative Trial (PROSPECT) and supplemented with the data from the National Death Index (Gallo et al., 2007). The PROSPECT, a study assessing the effect of care management on suicide risk for late-life suicide, integrated a randomized trial with a population-based, public health model (Alexopoulos et al., 2009).

Of those meeting the criteria for Gallo et al. (2007), the subjects were either randomly assigned to the usual care group to receive educational sessions with the primary care physician but no additional recommendations for management or the intervention group, where in addition to the educational sessions, they received education for their family and management of their depression within the practice. At the time of follow-up 223 of the subjects died; 17% (n = 108) of the patients without depression and 19% (n = 115) still diagnosed with depression at their death. The patients managed using the intervention was less likely to have died when compared to those in usual care practices. The algorithm-based intervention significantly reduced the risk for mortality in the older diagnosed with depression when compared to those receiving usual care. According to Wittkamp et al. (2007) when paired with the algorithm, the PHQ-2 is sensitive and specific in diagnosis depression.

The significance of the findings was criticized by Thombs and Ziegelstein (2008a) secondary to the method of covariate adjustment in the study, which they believed prescreened the variables. The concern was if the findings would be valid in another

similar sample of patients. Gallo et al. (2007) reports an adjusted hazard ratio of the standard error (SE) as a means of allowing for the examination of the main effects. The adjusted baseline terms were age, gender and education, if they were smokers, cognition, suicidal ideations at baseline or a medical diagnosis of cardiovascular disease, stroke, diabetes or cancer. According to Gallo et al. the results were the same despite the adjustment. In their study Kroenke, Spitzer, and Williams (2001) adjusted age, gender, race, education, study site and physical disorders when testing the construct validity of the then fairly new instrument, the PHQ-9.

Patient Health Questionnaire (PHQ) in the Veteran Population

There is a projected increase of veterans aged 65 to 84 between 2010 and 2015 (Department of Veterans Affairs, 2009). The U.S. Department of Veterans Affairs (VA) has mandated annual depression screening at VA primary care clinics. To determine if the measures are being met, there is performance measures linked specifically to the guidelines developed in collaboration with the DoD (Francis & Perlin, 2006).

The largest cohort study undertaken by the United States Department of Defense, The Millennium Cohort, began in 2001 with the goal to collect health outcome information as well as occupations and environmental exposure. With over 100,000 U.S. service members participating, the first panel enrollment was over 100,000 (Ryan et al., 2007). The large population was beneficial in testing the validity and reliability of a number of standardized instruments like the Patient Health Questionnaire. With the large military cohort, the internal consistency of the well-known instruments was again confirmed by an investigation by Smith, Smith, Jacobson, Corbeil, and Ryan (2007).

To identify undetected cases of depression and improve diagnosis, Arroll et al. (2010) encourage using the PHQ-2 and PHQ-9 as reference standards. Each tool is valid in detecting more depressed patients. One validation study was conducted by Arroll et al. (2010) with 2,642 patients completing the PHQ-2 and the Composite International Diagnostic Interview (CIDI), a computerized software programs taking one to 10 minutes to complete. The time to complete determines the level of depression; one minute if not depressed, up to 10 minute if depressed. Sensitivity and specificity of the PHQ-2 was 86% and 78% for diagnosing major depression.

The Patient Health Questionnaire (PHQ), a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD) diagnosis treatment (Kroenke et al., 2001), is a tool instrumental in screening and monitoring depressive symptoms (Chen, Huang, Chang, & Chung, 2006; Department of Veterans Affairs, 2009; Gilbody, Richards, Brealey, & Hewitt, 2007; Wittkamp et al., 2007) that is reliable and valid (Arroll et al, 2010; Kroenke et al., 2001) in monitoring the severity of depression along periods of time.

The PHQ-9 was developed to screen and diagnosis depressive disorder in the primary care setting (Kroenke, Spitzer, & Williams, 2001; Wittkamp et al., 2007). The PHQ-2, an abbreviated version of the first two items from the PHQ-9, depressed mood and anhedonia, and is often used as an initial screening tool (Arroll et al., 2010; Phelan et al., 2010). Using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS), an instrument to assess scientific quality, Wittkamp et al. (2007) systematically review the psychometric literature to investigate the diagnostic accuracy of the PHQ-9. From the

retrieval of 233 articles, 40 were included in the review. The cluster results of the psychometric properties of the PHQ 9 indicate a sensitivity and specificity of 0.77 and a 0.94, respectively.

Results from 6,000 patients completing the self-administered version of the PHQ-2, by Kroenke et al. (2001) to validate the PHQ-9 and the instrument's ability to measure depression were confirmatory. At the time of the study the PHQ-9 was still considered new as it was developed in 1999 by the same author. Initially, the PHQ was three pages in length and assessed eight mental health diagnoses corresponding to specific *Diagnostic and Statistical Manual for Mental Disorders*-fourth edition's (DSM-IV) diagnosis, including major depressive disorder (Spitzer et al, 1994). The PHQ-9 was the first self-reporting questionnaire reflecting the depression diagnosis based on the DSM-IV).

Results confirmed that if the PHQ-2 yields a positive result, this may be indicative of depression with a follow-up PHQ-9 to be administered for confirmation. A PHQ-9 score of five is indicative of depressive symptoms (Kroenke et al., 2001; Wittkamp et al., 2007). A certain score on the PHQ strongly correlates with a diagnosis of major depression but we understand that correlation is not equal to causation. Not everyone with a high score has major depression. The intention of the PHQ-9 is to assist clinicians with identifying and diagnosis depression, but is not as indicated Spitzer et al. (1994), it is not a substitute for the trained clinical.

Each of these tools is preferred by physicians because of their ease in administering. The PHQ-2 takes an average of one minute and can be answered with a point system or yes/no (Kroenke et al., 2001). In addition to the quick administration,

the tool is uniform across any age group without any special cut off scores being required and is sensitive to depression over time (Arean & Ayalon, 2005).

The Patient Health Questionnaire (PHQ-2) is also recommended to assess depression in those patients diagnosed with CVD. The PHQ-9 is administered if a positive is reported on one or both of the items in the PHQ-2 (Davidson et al., 2006; Thombs et al., 2005). Thombs, Ziegelstein, and Whooley (2008b) evaluated the characteristics of the PHQ-2 and the PHQ-9 in comparison with the Computer Diagnostic Interview Schedule (C-DIS). Their findings indicated each instrument had an overall similar diagnostic accuracy. Of the 1,024 outpatients included in the study, 22% had current major depression. The PHQ-2 was 82% sensitive and 79% specific and the PHQ-9 yielded 83% sensitivity and 76% specificity. The two-step screening approach (if PHQ-2 positive, follow-up with PH-9) was less sensitive (75%) but more specific (84%) than either of the PHQ items.

Establishing the validity of the PHQ-2 and the PHQ-9 is important as each can positively impact the outcome of accurate assessment, treatment and management of depression. The validity of the PHQ-2 makes it a reasonable measure for assessing depression (Kroenke et al., 2001). According to Wittkamp et al. (2007), the PHQ-9 is valid in selective subgroups where there is a high prevalence of depression. The groups could be those individuals consulting their primary care providers with unexplained somatic symptoms. When used with an algorithm, the PHQ-9 has a high specificity of 0.94. The reliability helps to avoid over diagnosis of depression (Wittkamp et al., 2007).

Conducting two studies with a total of 6,000 patients participating, Kroenke et al. (2001) confirmed a strong validity for the PHQ-9 and its ability to measure depression.

The PHQ is accurate in detecting depression but is only the first in the assessment process. In primary care, the detection is followed by more thorough assessment and periodic follow-up if treatment is indicated (Kroenke et al., 2001). Li et al. (2007) compared the PHQ-2 against the DSM-IV diagnosis for depression (Appendix B). The PHQ-2's criterion validity and construct validity were calculated. The findings were that the PHQ-2's criterion validity for major depression is good and the specificity increased with age. The researchers concluded that the PHQ-2 was a valid screen for major depression in older people.

The VA's have a statutory mission to conduct research to enhance the health of veterans as well as the health of the nation (Francis & Perlin, 2006). In addressing the diagnosis and management of psychiatric disorders, The U.S. Department of Veterans Affairs (V.A.) mandated annual depression screening at V.A. primary care clinics at least annually (Kirkcaldy & Tynes, 2006; Oslin et al., 2005). One of the mandatory tools is the Patient Health Questionnaire (PHQ-2). The tracking of the depression screening is through a clinical reminder which automatically displays when entering the veterans electronic chart. The clinical reminder will prompt to the providers that a depression screening is to be completed (Oslin et al., 2005). The CPRS gives an alert the screen is due in a text box highlighted in the electronic medical records (Kirkcaldy & Tynes, 2006) records system (CPRS), which also prompts the providers to complete screening. The two-item Patient Health Questionnaire (PHQ-2) tool, is often completed prior to the

clinic encounter with the physician or nurse practitioner, either by a health tech or licensed practical nurse (LPN) during the veteran's primary care visit (Department of Veterans Affairs, 2009). The results of the PHQ-2 can be as simple as *Screen is Positive* but does not inform about the evaluation, treatment and long-term management processes that follow a positive screening.

Along with the performance measures, there are clinical reminders in place. The Patient Health Questionnaire-2 items (PHQ-2) is a clinical reminder completed by a health tech during the primary care visit at the VA included in this study. The clinical reminder/screening is often completed prior to the clinic encounter with the physician or nurse practitioner assigned to this patient for medical management. The results can be as simple as *Screen is Positive*. The southeastern medical center in this study is meeting this performance measure by 100% (Department of Veterans Affairs, 2009) but there is not a lot known about the evaluation, treatment and long-term management processes that follow a positive screening (Kirkcaldy & Tynes, 2006).

Managers within the VA are held accountable for reaching the established targets in the evidence-based measures of quality. The southeastern VA involved in this study is currently meeting the performance measure at 100%. This means that all veterans entering the VA health care system are screened for depression at least annually as stipulated by federal mandates. Once the patient is seen by the physician or the nurse practitioner, it is that provider's responsibility to assure the screening tool was complete and to address if positive.

Contributing Factors

Contributing factors to depression can include, but not limited to, genetic influences, hormonal responses to stresses, response to acute or chronic illness, or psychological or social factors. Although there have been increases in diagnosis of depression over the last 10 years, the majority of those diagnosed with a mental disorder still do not receive treatment (Keesler et al., 2005).

Biological Factors

Wells et al. (2010) used the Millennium Cohort Study, the largest population based prospective study of military personnel, to identify service men and women free of depression at baseline. The enrollment period was July 2001 to June 2003. The men and women were categorized: not deployed (men = 22,126, women = 8,543), deployed without combat exposure (men = 3,940, women = 744) and deployed with combat exposure (men = 3,975, women = 744). When comparing the nondeployed to other groups, the men and women were more likely to be younger and serving on active duty. For the men and women deployed without combat exposure, they were more likely to have some college education, have an occupation listed as *other* and be in the U.S. Air Force. Those deployed with combat exposure is more likely to have high school education or less, be a combat specialist and be serving in the U.S. Army, as compared to nondeployed men and women. Deployed women were more likely to have never been married compared with nondeployed women. When looking at depression, the men and women deployed with combat exposures had the highest occurrence of new onset depression, 5.7% and 15.7%, respectively. The highest percentage of new onset of

depression were more likely to be those men born in 1980 or later, have less education, other than married, current smoker, enlisted, and serving in the US Marine Corps or US Army. The final conclusion was that men and women without combat exposure were significantly less likely to develop depression when compared to nondeployed men and women.

Li et al. (2007) performed a study comparing the PHQ-2 against the DSM-IV in diagnosing major depression. The authors examined both tools performance across age, sex and racial/ethnic groups. The findings indicated little clinical significance for the PHQ-2's specificity when evaluating age, sex and racial and ethnic groups. In addition to the age, sex and race or ethnicity, Li et al. (2007) included marital status, number of children, living arrangements, rural or urban status and the region of the United States in which they lived. Socioeconomic variables, psychosocial stressors and health status were also included as variables. The final sample size was 8,205 adults aged 65 and older. Over half (58%) of the population were female and 19% racial or ethnic minorities. Subjects with a positive PHQ-2 were most likely to be non-Hispanic White, more educated, and had fewer psychosocial events. There were fewer comorbidities and reports of poor health among these non-Hispanic Whites.

Shen, Findley, Banerjea, and Sambamoorthi (2010) discussed diabetes, heart disease and hypertension in the women veteran population. The authors compared the rates of major and minor depression with women veterans diagnosed with either of the disorders by demographic, socioeconomic and health status. The study included 13,430 women veterans using the Veteran Health Administration (VHA) clinics. The

retrospective cross-sectional analysis included data from the 2002 and 2003 fiscal years and found that 27% of the women veterans were diagnosed with depression. A further evaluation revealed that 60% indicated minor depression while 40% were diagnosed with major depressive disorders (MDD). The authors concluded that minor depression is highly prevalent among women diagnosed with chronic conditions, like hypertension, heart disease or diabetes. Although the primary focus of the study was to compare the rates of depression with chronic diseases, the Shen et al. also examined the variations based on gender, age, race/ethnicity, residence, supplemental insurance, physical and mental conditions, and substance use. The age group of less than 50 years of age was more likely to be depressed than those over 75 years. The women veterans enrolled in both the VHA and Medicare were 43.3% more likely to be diagnosed with major depression than the 36.8% only enrolled in the VHA. No racial or ethnic differences were significantly found.

Findley, Shen, and Sambamoorthi (2011) investigated the association between multimorbidity and the dependent variable of persistent depression. The cohorts of 1,383,950 veterans with diabetes, heart disease or hypertension were included in this retrospective longitudinal analysis. Other independent variables were controlled for and a multinomial logistic regression with *no depression* as the reference group. The findings were a higher prevalence, 43.1% of veterans, had concurrent presence of at least two chronic conditions. They also mostly lived in the metropolitan areas and married. The majority, 75.5% of the sample was White and had Medicare coverage. The study also revealed a higher percentage of depression when combined with substance abuse. The

presence of chronic diseases and depression bring focus to the need for more efforts to reduce the disease.

Late life depression can have an impact on the recovery from surgeries and other serious illnesses related to mortality. In the elderly population age 65 and older, the incidence of depression is approximately 15% annually. After age 70, the incidence doubles annually (Alexopoulos, 2005). Depression later in life is a common and regularly reoccurring illness that is often unrecognized and under treated. The unrecognized and under treating often is associated with significant co-morbidities and poor health outcomes (Rajji et al., 2008). The authors conducted a systematic review dating 1996 to August 2007 and found that late-life depression is common in several settings but the highest rates have been observed in medical populations. In the primary care setting, 6%-9% can be seen in the primary care setting.

Not only is depression costly and debilitating, but in relation to mortality, it can contribute to the slow rate of recovery in some surgeries and serious illness (Unutzer et al., 2006). Screening for depression in the older adult population can improve the likelihood of them receiving treatment. The screening allows for proper detection and management of the disease process if the screening is positive (Kroenke et al., 2001). Pignone et al. (2002) offer a summary of the evidence for the U.S. Preventative Task Force. Their purpose was to add clarity if there is an improvement of recognition, treatment and clinical outcomes for the adults screened for depression.

Social Factors

When looking at income for the primary care mental health patient, Uebelacker, Smith, Lewis, Saski, and Miller (2009), examined depressed patients for predictors based on the type of treatment they received, if they followed the treatment and the characteristics of the patient who did receive the treatment. The authors hypothesized the minority status and lower income would be a predictor and decrease the likelihood of the already depressed patient receiving treatment. The study used the PHQ-9 as a screening tool for the 12,500 patients. Various treatments were prescribed but each of the patients received psychotherapy onsite. Of the 83% meeting the full criteria for depression and receiving the treatment offered, only 53% reported receiving adequate treatment. What the researchers found was that individual with poorer problem solving skills were more like to accept the treatment offered. The hypothesis was accepted. Race made a difference when it came to care as the minority patients were less like to receive any care. They were more depressed, poorer problem solvers, and had poorer physical health and as mentioned, would more likely receive minimal adequate treatment for depression.

Major depression and post-traumatic stress disorder is the focus of a number of research publications (Adler et al., 2011; Barber, Bayer, Pietrzak, & Sanders, 2011; Bryan & Corso, 2011; Campbell et al., 2007; Geritty, Carson, & Dobsha, 2007; Harpaz-Rotem & Rosenheck, 2011). Wells et al. (2010) investigates the relationship between deployment and new onset of depression among U.S. service members recently deployed to the Iraq and Afghanistan. Separating the service men (3,949 men and 891 women) deployed from the service men not deployed (22,126 men and 8,543 women), the men

and women with combat exposure had the highest occurrence of new onset of depression (5.7% and 15.7%, respectively). There were some services deployed but not exposed to combat. The occurrence of new onset of depression in this sample population was 2.3% and 5% respectively. The trend noted is consistent when demographic, behavioral, and military-related characteristics are compared. Across all three groups, men had the highest percentage of new-onset depression, were less educated, current smokers, enlisted and either serving in the Marine Corps or the Army. Some of the same demographic characteristic was noted to be significant in a study conducted by Li et al. (2007). Li et al. added socioeconomic variables (annual household income and health insurance), psychosocial events and health statuses (self-reported health status and number of comorbidities) and mental health, social functioning, body mass index and alcohol drinking status. The male servicemen have the higher risk of alcohol use (Clinton-Sherrod, Barrick, & Gibbs, 2011).

Wells et al. (2010) added the racial and education component but Li et al. (2007) used the PHQ-2 to identify that most of the depressed would be non-Hispanic Whites, with more education. Employment was not considered in the study by Li et al. and Wells et al. but Zivin et al. (2011) evaluated the correlation between mental disorders and labor forces. The findings were that most of the veterans using the Department of Veterans Affairs were not employed. Of the 98,867 veterans included in the study, 36% were disabled and 35% employed. Those in retirement were 20% of the sample population. Zivin et al. (2011) found there was no relationship between employment and mental disorders.

Erbes, Kaler, Schult, Polusny, and Arbisi (2011) investigated the role of mental health diagnoses on occupational functioning in a group of 262 National Guard/Reserve service members. The findings were that service members with a major depressive disorder (11%, $n = 29$) did not differ on employment status of service members without a diagnosis. What was noticed in their research were services members with a diagnosis of post-traumatic stress disorder, depression, and/or alcohol abuse reported lower levels of work role functioning.

Environmental Factors

According to Bray et al. (2010), the rate of cigarette smoking is lower in the veteran enrolled in the VHA than those in active duty military. The Institute of Medicine (IOM, 2009) offers a socioecological framework for the relations between smoking behavior among active duty personnel and veterans. The framework describes individual and societal levels that include health-related behaviors, including smoking. Social demographic and comorbidities are variables identified at the individual level. Societal variables include deployment to a war zone.

Genetically Fu et al. (2007) connect the influence of depression to nicotine dependence. Performing a logistic regression to analyze the association between the factors, the environmental factor was found to be causal for some depressive symptoms. In addition, it was concluded that depression decreases the changes of an individual's smoking cessation. There is also a documented relationship between chronic obstructive pulmonary disorder (COPD) co-occurring with depressive disorders (Jordan, Lee, Valenstein, & Weiss, 2007).

Currently, major depression is the leading cause of disability in the United States and by the year 2020 it is expected to be the leader worldwide (VA Mental Health Quality Enhancement Research Incentive [QUERI], 2008). There is an approximately 90% overlap between medical conditions and mental health issues seen in the primary care clinic annually (Bluestein & Cubic, 2009; Funderburk et al., 2011). According to Oslin et al. (2006) it is the interaction of these medical and mental health issues that increase the complexity of health care needs; therefore impacting health care quality. National Alliance of Mental Illness (NAMI, 2006) concurs describing a strong relationship between physical health and depression. Contribution to depressive symptoms could include genetic influences, hormonal responses to stress, response to an acute or chronic illness, psychological or social factors (NAMI, 2006). When the individual is already diagnosed with a medical illness and presents with depressed mood or anhedonia, the diagnosis is often identified as depression due to a general medical condition.

Barber et al. (2011) examined the rate of overweight and obesity in 1,553 veterans setting up their routine care. A retrospective chart review was conducted and the study indicated that veterans had a higher rate of overweight than the national sample in the same age group, but a lower rate of obesity. The researchers conclude that weight was not an indicator of PTSD nor depression.

Suicide in Depressed Veterans

Suicide was one of the factors identified as a comorbid disorder with depression. Mrnak-Meyer et al. (2011) added age, gender, ethnicity, marital status, and social support to their research and concluded no significant improvement in the prediction of suicide-

related hospitalization beyond the history of a previous suicide attempt, as the researchers identified the history of a suicide as the only significant predictor of hospitalization during a one-year follow-up period. Cully et al. (2008) attempted to include these factors (age, gender, race, and ethnicity) along with marital status and income in their examination of the VA data over a six-year period. The purpose of the research was to examine depression care related to the patient's health and mortality. There were 205,165 veterans with new-onset depression included in the sample but because race and ethnicity information was poorly populated, they were excluded from all predictive analysis.

Sometimes those entering the clinic are at an increased risk of posttraumatic stress disorder and depression (Lapierre, Schwegler, & LaBauve, 2007) with a continued increase in the rate of suicidal behavior (Kuehn, 2009) . McCarthy, Thompson, and Knox (2012) conducted a study to evaluate the sensitivity and specificity of a tool the military members are required to complete within 90 to 180 days after their return from deployment. The Post-Deployment Health Reassessment (PHDRA), a Web-based three page self-reported questionnaire, has been used since 2005 as a means of assessing the military members, however, McCarthy et al. (2012) wanted to determine if the tool could identify both posttraumatic stress disorder (PTSD) and depression. In their study, the comprehensive population sample of 58,242 active reserve and National Guard airmen completed the PHDRA. This sample was adaptable to numerous statistical analyses. The questionnaire included questions related to demographic characteristics, general health, physical symptoms, environmental exposures and a mental health item. For depression, the researchers found the PHDRA was sensitive and specific to both depression and

posttraumatic stress disorder (sensitivity of 0.704 and 0.774) and (specificity of 0.651 and 0.650) respectively. The PDHRA identified behavioral concerns many airmen displayed before the development of diagnosable mental health conditions per criteria. As a result, there was a reduced barrier to care and increased support services for those who symptoms were not readily visible or easily diagnosed otherwise.

The PHDRA actually becomes part of the military member's medical record. Once completed, and it then integrated into the Defense Medical Surveillance Service database (Miliken, Auchterlonie, & Hoge, 2007). If the military member score results were positive on the PDHRA, the PDHRA manager would give them a telephone call to follow-up or they are immediately referred to a medical provider. The airman would be allotted the opportunity to complete the PTSD Check-list - Military Version (PCL-M) to further assess trauma symptoms and the Patient Health Questionnaire-9 (PHQ-9) to evaluate depression. In the study conducted by McCarthy et al. (2012) the positive PDHRA score was more indicative of depression. The sensitivity and specificity for depression was 0.704 and 0.651 respectively.

The Department of Defense (2010) has developed a task force with the specific goal to address suicide among members of the armed forces. The World Health Organization (WHO, 2010) estimates a global mortality rate of 16 per 100,000 individual dying from suicide annually. Ranking suicide as the 10th leading cause of death across the world, the estimation is one suicide every 40 seconds. Although the rate traditionally has been higher in the elderly male, the younger population is increasing. Mental disorders, especially depression and alcohol use, are major risk factors and often involve

psychological, social, biological, cultural and environmental factors. The Substance Abuse and Mental Health Administration, Office of Applied Statistics (SAMHSA, 2010) discussed the average for the United States. An estimated 8.3 million adults 18 years or older had serious suicidal thoughts and, 3.3 million made a plan and 1.1 million attempted suicide.

Although the demographics and health care needs and habits of the U.S fighting forces may have undergone changes, still a disproportionate prevalence of PTSD, depression and substance abuse remains unchanged from generation to generation of veterans. For the health care provider working within the veteran population, they encounter unique challenges. This culture, unique within itself and possessing its own language, includes inequalities and health disparities of which depression and suicide rank very high. Hence it is imperative for the health care providers to understand this population in order to effectively formulate responses to their health care needs (Hobbs, 2008).

According to the Department of Defense (2010), there were over 1,300 suicides among members of the United States military, with the rates increasing in the Marines and the Army. Zivin et al. (2007) used a national representative data base to determine the suicide rate among veterans. Of the 807,694 in the study, 1,683 committed suicide during the study period. The study indicated a higher rate of suicide in the South than the Northeast, 89 % versus 74%, respectively. Service connection was also viewed and the results indicated that veterans with a service-connected disability had a lower rate of suicide than those without a service-connected disability 70% versus 92%, respectively.

When looking at the physical comorbidities, there were no significant impact on the rate of suicide with those who had no physical comorbidities, 84.86% versus 84.65% respectively. It was concluded that the increased suicide risk were among the younger, non-Hispanic male veterans.

Kaplan et al. (2012) discussed the suicide risk and precipitating circumstances observed in the male veterans. Using data from the National Violent Death Reporting System (2003-2008), the study's purpose was to compare veteran men relative to nonveteran men by age. The findings were that veterans were at a higher risk of suicide compared to nonveteran in all age groups except the oldest (65 years or older). The comparison included health status, stressful life events preceding suicide and the means of death among the veterans. The sample included 8,440 veterans and 21,668 nonveterans. The older veterans were more likely to be White, married compared to their younger counterparts. The young veterans reported different circumstances and were more likely to have intimate partner problems, as well as financial, occupational and legal difficulties. The older veterans displayed more health problems shortly before suicide.

It is just as imperative for the Department of Veterans Affairs to address the higher rate of suicide in the Operation Enduring Freedom/Operation Iraqi Freedom veterans. In the literature the increased rate is contributed to the extension and concurrent wary and the requirements placed on the military members (Department of Defense Task Force on Mental Health, 2007; Selby et al., 2010; Snarr, Heyman, & Slep, 2010; Yamane & Butler, 2009). Although there is a decreased rate of suicide, the overall rate in the U.S.

Military, based on age, gender and race, is lower than civilians, particularly men (Yamane & Butler, 2009).

A report by the Department of Veterans Affairs (2011) identified an approximate vulnerability to suicide for the veteran population at 30,000-32,000 annually, with 11% attempting suicide within 90 days of the last visit. Ilgen et al. (2010) examined the strength of the association between psychiatric diagnoses and the risk of suicide among 3,391,891 veterans using the Veterans Health Administration during fiscal year 1999 (October 1, 1998 to September 30, 1999). The veterans were followed for seven years, or until their death. A total of 7,684 died as a result of suicide during the timeframe. Although suicide's strongest associating condition was bipolar disorder (9%), depression was the next strongest. As such, Blow et al. (2012), sought to examine the rates of suicide over an eight year period (October 1, 1999 to September 30, 2007). The annual cohorts included a total of 8, 855,655. Interestingly, a decrease in suicide among the veterans was concluded. Men between the ages of 30 and 64 were at the highest risk.

Smith et al. (2011) obtained service and pharmacy data from 1,843 veterans who died from suicide who had been diagnosed with depressive disorder from April 1999 to September 2004. The majority of the veterans, 43%, had visits with mental health services within 30 days of their death. Fifty-seven percent of those seen within 30 days were seen in non-mental health settings. In evaluating the 57% seen in a non-mental health setting, only 34% had a mental health diagnosis coded on that last visit and adequate dosages of antidepressants were only prescribed in 41%. Smith et al. (2011) concluded with recommendations of increased attention to mental health issues in the

non-mental health setting, focus on adequate treatment and increased referrals to mental health professionals.

Ilgen et al. (2012) identified a racial and age component in their 16,892 sample of VHA patients who died by suicide between October 1, 1999 through September 30, 2007; fewer Blacks received treatment and within the last 30 days of their VA visit before suicide, the older patients were treated for medical conditions. Ilgen et al. study data was obtained from the VA's National Patient Care Data Base (NPCD) and the National Death Index (NDI) whereas Smith et al. was from a smaller local data base.

Summary

The established limitation for the review of literature was the year 2007 to current. The references outside the time frame were significant in establishing the history of the PHQ-2, and a historical perspective of depression in the veteran population. Within this time frame there is limited information reviewing the prevalence of depression in the veterans or contributing factors. With the current war in Iraq and Afghanistan, the majority of the studies addressed issues in the veteran's population focusing on post-traumatic stress disorder or the younger veterans currently serving. Many of the combat veterans do not qualify for services at the VA because there is a time limit on the services they can receive. Until January 2008, when congress extended their combat health benefits to five years post discharge, the Operation Enduring Freedom and Operation Iraqi Freedom (OIF/OEF) veterans could only receive care free care for two year from their service separation. Many of those with health insurance through their employer no

longer seek care from the VA (Seal, Berthenthal, Miner, Saunak & Marmar, 2007). Some of the older literature identified factors such as unemployment, poor productivity.

The female veterans are also at risk factor for depression (Hasin, Goodwin, Stinson, & Grant, 2005) but in the review, the female population was not equally represented in the research. This population also often has a unique set of contributing factors to their depression. The implementation of a tool can help better address the unmet needs for the veterans, including the female and older veterans, currently seeking services with the Veterans Affairs Hospital. Furthermore, limitation quality and quantity of studies predicting the factors contributing to depression based on a positive PHQ-2 could suggest that recognition and treatment is not fully adequate in the primary care setting secondary to the lack of evidence-based research. This study will offer a model to help identify the identify factors contributing to depression and assist the primary care providers in providing the collaborative care the VA seek.

A devastating factor to consider with depression is suicidal ideations, attempts or successful completion. Suicide is a major focus in the literature but, the subjected being studied are current veterans either serving or recently returning from combat. Therefore, this review of literature consisted of 77 studies of depression among the veteran population. These studies all agree that depression is a major problem in the veteran population that needs to be addressed. Studies on the PHQ-2 attest to its validity and reliability in detecting depression given veterans fully disclose and that provider follow through with the federal mandates to assess for depression. Of research presented, no studies were found that attempted to use the results of the PHQ-2 in combination of select

biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management) variables in which to create a predictive model for depression as was proposed in the study.

CHAPTER IV

METHODOLOGY

Depression has been identified as a major health care problem in the general population and is identified as being associated with increased morbidity, mortality, and lower quality of life (U.S. Preventative Services Task Force, 2009). Further, major depression is identified as a leading cause of disability in the United States (Machado & Tomlinson, 2011). Approximately one of every three veterans visiting primary care has symptoms of depression, with one in eight requiring medications or psychotherapy (Rubeinstein et al., 2004).

Given the known prevalence and associated comorbidities of depression in the general population, the purposes of this study were to determine the prevalence of depression in a veteran administration hospital in the southeastern section of the United States as measured by the patient health questionnaire-two times (PHQ-2) and to create a model for predicting depression based upon the associated biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management) variables.

Research Design

The research design for this study was predictive correlational. The investigator was interested in the prediction of depression based on the associated independent

variables. The predictive correlational study examined if the variables would occur without implying that one caused the other. With the correlational coefficient a degree of linear association was measured. This means an increase in one variable created like increases (or decreases) in the other variable; therefore revealing the strength, direction, and shape of the relationship. When the two variables are unrelated, or have little effect on each other, the correlation coefficient was close to zero. The high score on one variable predicted the high score on the other, the correlation is considered positive. The correlation coefficient measured only the degree of association between two variables and does not indicate a cause and effect relationship (Cooper & Schindler, 2011).

With this predictive correlational design, the co-variation of variables was investigated without manipulating any aspect of the study (Leong & Austin, 2006). For the study, the presence or absence of depression, as measured by the PHQ-2, was the dependent variable, and biological, sociological, and environment variables were the independent variables. Each of the variables was collected from the veteran's electronic medical records. On the basis of knowledge about one or more predictor variables (selected biological, social, and environmental), logistic regression was used for the prediction of the dependent criterion variable PHQ-2. Logistic regression was appropriate in identifying the relationship between multiple independent and a categorical dependent variable. For environmental data, the Pearson correlation coefficient was used for analysis. The magnitude of the relationship, the direction and the r^2 can be represented. Logistic regression is based on the assumption the underlying relationship among the variables does not have to be linear and multivariate; and does not require any

assumptions about the distribution of the predictor variables be made by the researched. The value predicted in the logistic regression was a probability ranging from 0 to 1. Logistic regression specifies the probabilities that an outcome will be either one category or the other from each subject (Cooper & Schindler, 2011).

A descriptive, exploratory design was used to examine the relationship between the criterion variable, a positive PHQ-2score, and multiple independent or predictor variables: biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service, and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management). Only the three most common comorbid diagnoses were included; hypertension, diabetes and cardiovascular disease.

Sample and Setting

The sample was extracted from a database of records for veterans seen at the government agency and its community based outpatient clinics (CBOCs) located in a southern part of the United States from January 1, 2011 through December 31, 2011. Retrospective data were collected from the individual electronic charts (N = 300) who were seen in the primary care setting. Participant inclusion criteria: male or female veterans at least 18 or older at the time of chart review, patients screened with the PHQ-2, and not currently hospitalized. Participant exclusion for this study was diagnosis of

depression, nursing home resident, taking antidepressants or diagnosed with bipolar or schizophrenia.

Power, Effect and Sample Size

Katz (2011) pointed out 10 outcomes for each independent variable is appropriate, although there is no consensus on the approach to computing power and sample size for logistic regression. The number of subjects necessary to reject the null hypothesis refers to the power of test. Cooper and Schindler (2011) indicate the power of the test relies on the degree of the probability that exist, the effect size, the reliability of the data, and the significance of the established criterion. A low power may be ambiguous in failing to reject the null hypotheses. Notable difference may exist, but inadequate sampling can prevent calculated values large enough to exceed the test's critical value. A Type 1 error occurs when the null hypotheses is rejected when in fact there is no difference in the population. A Type 2 error occurs when the null hypothesis should have been rejected, meaning that the treatment or intervention was effective but the outcome statistic indicated a failure to reject the null hypothesis.

Procedure

Approval by the Institutional Review Board of the selected government agency and the University of Southern Mississippi (Appendix F and Appendix G) was obtained. Following the initial approval from the selected government agency, a request was submitted to the informational technology department for an encrypted jump drive and data warehouse for a list of veterans evaluated in the primary care clinic beginning January 1, 2011 through December 31, 2011. The total number of visits in the primary

care clinics (442,149) were reviewed and purged to eliminate duplicate veterans. The final number to include in the sample size calculator was 30,897 unique encounters for the time period identified. The final number of veterans, 30,897, was applied to a sample size calculator for a final number of 300 charts for review.

A record abstraction questionnaire, The PHQ-2 Response Record (Appendix C), was developed to guide in the gathering of information from each veteran's electronic health record. The demographic portion of the chart abstraction was designed to collect information (demographic and personal data) from which a profile of the sample could be developed. Data included age, gender, diagnosis, PHQ-2 score, and service records.

Inclusion and Exclusion Criteria

The study sample consisted of male and female veterans enrolled in a southeastern government agency's primary care clinic between January 1, 2011 and December 31, 2011. Veterans age 18 and older at time of chart review were included. The veterans currently residing in a nursing home, those still enlisted, and the veterans diagnosed with a mental health illness or taking antidepressants were excluded from the study. From January 1, 2011, through December 31, 2011, 30,897 enrolled veterans were evaluated and considered for the study.

Instrumentation and Materials

The research data were obtained through a chart review and questionnaire, the PHQ-2 Response Record (Appendix C). The questionnaire, developed by the researcher, was used to obtain information from electronic records relevant to PHQ-2 results and other demographic variables which would help to describe the sample. The VA Data

Warehouse is a database containing information on each clinical facility in the region and the national VA database. The local VA Data Warehouse was used to extract all the veterans treated in primary care during the identified time. Data were initially coded using the name and last four digits of the social security number to allow for matching data from the various sources. Once data from the sources were identified, veterans were assigned a random identification number to prevent the veterans from being identified directly or through identifiers.

Data Management

To maintain confidentiality, all information was stored at the selected government agency in a locked file cabinet located in a locked office. Only the researcher had access to the veteran's information. The veterans were initially coded using their social security numbers to allow for the matching of the data but was later assigned a random digit to prevent any identification of directly or through identifiers. The data was entered the same day of collection by the researcher. A random number sheet was generated using Excel.

The SPSS 20.0 was utilized to analyze the data collected in the study. To characterize the sample, the initial description statistics were computed (mean, median, mode and standard deviation) for numerical variable. The Chi-Square test or χ^2 was used in this study to determine proportional differences among variables when biological (age, gender, race, body mass index (BMI), medical comorbidities), social (marital status, service connection percentage and category, education, socioeconomic status based on the means test category, insurance coverage), and environmental (employment, military

status and branch of service, smoker or non-smoker, if physical activity was documented, and referral to the MOVE!® program for weight loss/management) factors was analyzed. Pearson's correlation was computed to measure the association between continuous variables. Logistic regression was used to examine the facts that increased the risk of depression.

Human Participants Rights and Risk

To ensure protection of all subjects' freedom from intrinsic risk or injury, all human subject protection considerations were utilized in this study. This study utilized a retrospective chart extraction, and all subject's identifying information were removed; therefore no informed consent was required. During the data collection process, all information was stored in a locked cabinet and only accessible to the principle researcher. All veterans' identifying data were removed and substituted by codes.

The Health Insurance Portability and Accountability Act (HIPAA) regulations were followed including restrictions of chart information to only those involved in this research project. Approval for the study was obtained from the Institutional Review Board at the University of Southern Mississippi and the government agency located in the Southeastern region of the United States (Appendix F and Appendix G).

The information was kept confidential, with limited identifying part of the data obtained. Data were presented in the aggregate to protect the identity of the veteran. The data were stored on an encrypted jump drive and SPSS 20.0 which was added to the investigator's computer for protection of the information. Information shared with the committee was not convertible back to the original data set. The name, addresses, and

social security numbers were maintained on a VA service and document of the procedure by which the data was coded remained in the VA.

Summary

The purposes of this study were to determine the prevalence of depression in a veteran's hospital system in the southeastern section of the United States as measured by the PHQ-2, and to create a model for predicting depression based upon these results and associated variables. The associated variables included biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service, and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management) factors.

This predictive correlational study was a retrospective study using information gather from the VISN 16 Data Warehouse of the selected VA healthcare system. The computerized records are a collaboration of information from four sources: The OEF/OIF Roster, the VHA Decision Support Service (DSS), the Patient Care Database, and the VHA Support Service Center (VSSC). Approval from the data warehouse was granted and the data were abstracted from the VISN 16 by the computer analyst assigned to the mental health department. The data included veterans evaluated in the primary care clinic from January 1, 2011 to December 31, 2011.

CHAPTER V

SUMMARY/RESULTS

The purposes of the study were to examine the prevalence of depression in a government agency located in a southeastern section of the United States as measured by the patient health questionnaire-2 items (PHQ-2) and to create a model for predicting depression based upon the results and associated biological, sociological, and environmental variables. The PHQ-2 is a mandatory screening tool within the organization chosen for the study. There are electronic reminders in place to alert the providers of the screening due date (Kirkcaldy & Tynes, 2006). In this chapter, results are presented including a profile of the sample.

Sample Characteristics

Data were collected through the retrospective audits of 300 veteran records for individuals receiving primary care services January 1, 2011 through December 31, 2011 at a large government agency in the southeastern region of the United States. The research data were obtained through a chart review and use of questionnaire. The PHQ-2 Response Record (Appendix E), for determining the prevalence rates of a positive PHQ-2 during the identified time. Data were analyzed from the initial review of 300 electronic charts. However, based on the inclusion criteria and the administration of the PHQ-2, 140 veterans were included in the study (Table 1).

Dependent Variable

The dependent variable (DV), also used synonymously with criterion variable, is measured, predicted or monitored and can be the presence or absence of a predicted

outcome within the selected cohort (Cooper & Schindler, 2011). In this descriptive study, the DV was having a positive PHQ-2 as documented in the medical charts utilizing the ICD-9 or DSM-IV codes.

Table 1

Descriptive Statistics for PHQ-2 Administered

PHQ-2	Frequency	Percent
Yes	140	46.7
No	159	53
Total	300	100.0

Independent Variables

Descriptive statistics were computed to summarize the means and percentages of the independent variables (IV) described in the study. Demographics variables of biological (age, race, gender, body mass index, and medical comorbidities), social (marital status, employment status, service connection percentage and category, education, socioeconomic status based on the means test, insurance coverage, branch of service and military status), and environmental (smoker or non-smoker, if physical activity was document, and referral to the MOVE!® Program for weight loss/management) factors were considered IV's in the study.

The positive PHQ-2 score ($n = 56$) was present in 18.7% of the veterans but the majority, 84%, denied any depression as noted in the negative results (Table 2).

Table 2

Descriptive Statistics for PHQ-2 Scores

Score	Frequency	Percent
Negative (0-3)	84	28.0
Positive (4-6)	56	18.7
Total	140	100.0

The SPSS 20.0 was utilized to analyze the data collected in the study. To characterize the sample, the initial description statistics were computed (mean, median, mode and standard deviation) for numerical variable (Table 3). The chi-Square test (χ^2) was used in this study to determine proportional differences among variables when biological (age, gender, race, body mass index (BMI), medical comorbidities), social (marital status, service connection percentage and category, education, socioeconomic status based on the means test category, insurance coverage) and environmental (employment, military status and branch of service, smoker or non-smoker, if physical activity was documented, and referral to the MOVE!® program for weight loss/management) factors were analyzed. Pearson's correlation was computed to measure

the association between continuous variables. Logistic regression was used to examine the facts that increased the risk of depression.

Table 3

Descriptive Statistics for Age and BMI

	Frequency	Percent	Standard Deviation
Age	63.93	65.00	16.66
BMI	29.98	28.99	6.52

The sample consisted of 130 men and 10 women, comprising 93% and 7% of the total participants respectively (Table 4). Combined, the mean age was 65 (SD = 16.66) with an average body mass index (BMI) of 28.99 (Table 3), which according to Center for Disease Control (2011) is overweight in status. Statistics also showed 51.4% (n = 72) Caucasian (Table 5). Regarding the marital status (Table 6), 62% (n = 87) were married.

The response for highest grade and also unemployment completed Table 7 and Table 8 were not indicated (n = 121) in the electronic records A little over 85% (n = 120) did not include the Veteran's employment status (Table 8) in the electronic records.

Table 4

Gender

	Frequency	Percent
Male	130	92.9
Female	10	7.1
Total	140	100.0

Table 5

Race

	Frequency	Percent
African American	60	42.9
Caucasian	72	51.4
Not Indicated	8	5.7
Total	140	100.0

Table 6

Descriptive of Marital Status

	Frequency	Percent
Single/Never Married	15	410.7
Married	87	62.1
Widowed	9	6.4
Divorced	29	20.7
Total	140	100.0

Table 7

Descriptive of Highest Grade Completed

	Frequency	Percent
7th-9th	13	9.3
High School/GED	6	4.3
Not Indicated	121	86.3
Total	140	100.0

Table 8

Descriptive of Employment

	Frequency	Percent
Yes	6	4.3
No	14	10.0
Not Indicated	120	85.7
Total	140	100.0

The current military status (Table 9) and branch of service (Table 10) was also examined. The majority (n=87) were National Guard while the most common branch of service was the Army (n=99). Appendix F and G further explains the enrollment priority group and the income threshold for the veterans.

Table 9

Descriptive of Current Military Status

	Frequency	Percent
Active Duty	15	10.7
National Guard	87	62.1

Table 9 (continued).

	Frequency	Percent
Reserves	9	6.4
Veteran	29	20.7
Total	140	100.0

Table 10

Descriptive of Branch of Service

	Frequency	Percent
Air Force	6	4.3
Army	99	70.7
Navy	23	16.4
Coast Guard	11	7.9
Marine Corps	139	99.3
Missing Data/Not Indicated	1	0.7
Total	140	100.0

The eligibility for comprehensive medical benefits for the enrolled veterans are based on Priority Groups 1 through 8 (Appendix C) and Groups 5 through 8 also include an income/means component (Appendix D) in this enrollment criteria. The majority of the veterans (n = 140) were enrolled in Priority Group 5 (Table 11). To be enrolled in Group 5, the three criteria include non-service connected veterans and noncompensable service-connected veterans who are rated at 0% by the Veterans Affairs with an income and/or net below the income threshold, receiving a VA pension, and are eligible for Medicaid. The income threshold (Appendix D) also used to determine if the prescriptions are free of charge and the medical deductions allowable (U.S. Department of Veterans Affairs, 2012). Based on the income threshold (Appendix D) or their compensable service-connected condition, many of the veterans qualify for free health care. In this study, the majority, 89%, reported some type of insurance coverage (Table 12) and 61.4% were not service connected (Table 13).

Table 11

Descriptive of Enrollment/Means Categories

	Frequency	Percent
Priority Group 1	19	13.6
Priority Group 2	17	12.1
Priority Group 3	14	10.0
Priority Group 4	16	11.4
Priority Group 5	42	30.0

Table 11 (continued).

	Frequency	Percent
Priority Group 6	10	7.1
Priority Group 7	20	14.3
Priority Group 8	2	1.4
Total	140	100.0

Table 12

Descriptive of Insurance Coverage

	Frequency	Percent
Yes	89	63.6
No	51	36.4
Total	140	100.0

Table 13

Descriptive of Service Connection

	Frequency	Percent
Yes	54	38.6
No	86	61.4
Total	140	100.0

MOVE!® is a weight management program designed specifically for the veterans. A mandate was implemented for all VA facilities to offer MOVE!® or an alternative weight management program. Only the veterans enrolled in the VA can access the program. Part of the program looks at hypertension, diabetes, cardiovascular disease and physical activity (U.S. Department of Veterans Affairs, 2011). Of the 140 meeting the study's criteria, the majority, 77.1%, were not referred to this mandatory program (Table 14).

Medically, over half (n = 99) the veterans administered the PHQ-2 had a hypertension diagnosis (Table 15). The diagnosis of diabetes (Table 16) was almost equal in the veterans (n = 140) with 50.7% positive for diabetes and 29.3% negative. This was not the case with cardiovascular disease (Table 17). The majority, 72.1%, of the veterans did have a document diagnosis of cardiovascular disease. Smoking (Table 18) was close as well with 42.9% smokers and 57.1% non-smokers and only 34% had any physical activity document (Table 19).

Table 14

Descriptive of Referral to MOVE!® Program

	Frequency	Percent
Yes	32	22.9
No	108	77.1
Total	140	100.0

Table 15

Descriptive of Hypertension

	Frequency	Percent
Yes	99	370.7
No	41	29.3
Total	140	100.0

Table 16

Descriptive of Diabetes

	Frequency	Percent
Yes	71	50.7
No	69	49.3
Total	140	100.0

Table 17

Descriptive of Cardiovascular Disease

	Frequency	Percent
Yes	39	27.9
No	10	72.1
Total	140	100.0

Logistic regression was used to measure if any predictive relationship was present between the categorical criterion dependent variable (PHQ-2) and the multiple predictor variables (selected biological, social and environmental factors). Logistic regression is a flexible model that has the capacity to analyze predictor variable of all types: continuous,

discrete, and dichotomous (Cooper & Schindler, 2011). The case processing table identified one missing case.

Table 18

Descriptive of Smoking

	Frequency	Percent
Yes	60	42.9
No	80	57.1
Total	140	100.0

Table 19

Descriptive of Physical Activity

	Frequency	Percent
Yes	34	24.3
No	106	75.7
Total	140	100.0

The proportional by chance accurate rate for the PHQ-2 scores was calculated by first calculating the proportions of the cases. Logistic regression compares this model including all the predictors to determine whether the latter model is more appropriate.

Table 20 suggests that if nothing is known about the variables, the veteran would have a positive PHQ-2 score 48% of the time; therefore 83% of the time, a positive PHQ-2 is not an accurate indicator of depression. The independent variables could be characterized as useful predictors of a positive PHQ-2 if the classification accuracy was substantially higher than the accuracy attainable by chance alone. In this study, the independent variables combined were not significant predictors. The accuracy rate computed by SPSS was 68.3% (Table 20).

Table 20

Logistic Regression Model: Chance Accuracy Rate

			Predicted		
			PHQ-2 Score of PHQ-2		
			1 Score	2 Score	Percentage
			Negative	Positive	Correct
Observed			(0-3)	(4-6)	
Step 0	PHQ-2 Score	1 Score	83	15	81.9
		Negative (0-3)			
	PHQ-2 Score	1 Positive	56	27	48.2
		Score (4-6)			
Overall Percentage					68.3

The presence of a relationship between the dependent and independent variables can be based on the Wald statistics. The strongest predictor of a positive PHQ-2, in order of significance, was the means test/enrollment category, marital status, branch of service, if the veteran was service connected, diabetes, and if the veteran was a smoker. Six independent variables indicators can possibly predict a higher PHQ-2 in the veteran population. For each variable in the equations, the constant was 0.60 (Table 21).

Table 21

Variables Inclusive in Equation

	B	S.E.	Wald	df	Sig	Exp(B)
Gender	.092	.817	.013	1	.910	1.097
Race			.241	2	.887	
African American	-.444	.957	.215	1	.643	.642
Caucasian	-.296	.894	.109	1	.741	.744
Age	-.009	.017	.284	1	.592	.991
BMI	-.002	.033	.003	1	.957	.998
Marital			3.206	3	.361	
Single/Never Married	.945	.814	1.347	1	.246	2.572
Married	.271	.587	.213	1	.644	1.311
Widowed	1.423	1.006	2.001	1	.157	4.150

Table 21 (continued).

	B	S.E.	Wald	df	Sig	Exp(B)
Service Branch			3.417	3	.335	
Air Force	-.667	1.276	.273	2	.601	.513
Army	-.663	.757	.768	2	.381	.515
Navy	.369	.860	.184	2	.668	1.446
Means Test Category			7.441	7	.384	
Group 1	.676	2.092	.105	1	.746	1.966
Group 2	1.386	2.111	.431	1	.511	4.000
Group 3	1.469	2.070	.504	1	.418	4.343
Group 4	-.346	1.754	.039	1	.844	.708
Group 5	-1.274	1.677	.577	1	.447	.280
Group 6	-.255	1.785	.020	1	.886	.775
Group 7	-.463	1.704	.074	1	.786	.630
Insurance	.001	.490	.000	1	.998	1.001
Service Connected	-1.432	1.192	1.443	1	.230	.239
Hypertension	.335	.466	.518	1	.472	1.398
Diabetes	.511	.417	1.502	1	.220	1.667
Cardiovascular Disease	.129	.454	.081	1	.776	1.138

Table 21 (continued).

	B	S.E.	Wald	df	Sig	Exp(B)
Smoker	.430	.427	1.013	1	.314	1.537
MOVE!®	-.256	.594	.186	1	.666	.774
Physical Activity	-.439	.546	.646	1	.421	.644
Constant	.600	2.566	.055	1	.815	1.821

The presence of a relationship between the PHQ-2 score and the combination of independent variables was based on the model chi-square at step 1. This occurred after the variables had been added to the analysis. The null hypothesis that there was a difference between the models with only a constant was rejected. The overall existence of a relationship between the independent variables and the dependent variable was not supported. In this study, the probability of the model $\chi^2(N = 139, df = 26) = 23.227, p = .620, R^2$ (Nagelkerke) = 0.208. The chi – square value of 23.227 with the identified p-value indicates the model as a whole does not significantly fit better than a model without predictors (Table 21).

The Wald statistics and associated probabilities provided an index for the significance of each predictor in the equation. According to the Wald, there were no criteria to predict depression but there are other factors worth discussing such as marital status and branch of service. The odds ratio indicated that single/never married and widowed veterans are more likely to have a positive PHQ-2 indicating depression, 2.75

and 4.15 times respectively. For a single/never married veteran there is a 75% increase in odds of a positive depression screening and a 15% increase for the widowed veteran. For the branch of service, the veteran who served in the Army has a 51% increase in odds of a positive depression screening (Table 21).

The chi-square value of 23.227 with the identified p-value indicates the model as a whole does not significantly fit better than a model without predictors. To look closer at the predictors, the variables were entered at the same time providing one model as the constant. In this study, the predication was not adequate, with 15% of the variation in the positive PHQ-2 score is explained by the logistic model. At 20.8%, there was not a strong relationship between the predictors and the prediction (Table 22).

Table 22

Model Summary

Step	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
1	164.190 ^a	0.154	.208

Hypothesis 1

It was hypothesized that a positive PHQ-2 score would positively correlate with a measure of biological factors of age, race, gender, body mass index and medical comorbidities in predicting depression in the veterans. One of the six predictors for a positive PHQ-2 is a biological factor (Table 21). The value of the Exp(B) improves the

odds that a positive PHQ-2 could occur within these independent factors. For every one unit change in a patient being diagnosed with diabetes, the chance of a positive PHQ-2 is increased by 0.667. The VA is the largest integrated health care system in the US (Department of Veterans Affairs, 2009) and with greater than 14% of the veteran population diagnosed with depression (NAMI, 2009) and 11% of those veterans age 65 and older being diagnosed at a rate more than twice found in the general population (Department of Veterans Affairs, 2009).

Hypothesis 2

It was hypothesized that a positive PHQ-2 would positively correlate with a measure of sociological factors of marital status, employment status, service connection percentage and category, and branch of service in predicting depression in the veteran population. Four of the six predicting variables supporting the relationship of a positive PHQ-2 are within the sociological factors. They include marital status, service branch, means test/category, and service connection (Table 21). The value of the Exp(B) improves the odds that a positive PHQ-2 could occur within these independent factors. For every four veterans of widow status, the chance of a positive PHQ-2 is increased by 0.150. The Navy branch of service has a strong chance of depression occurring.

Hypothesis 3

It was hypothesized that a positive PHQ-2 will be positively correlated with a measure of environmental factors for veterans being a smoker or not, if physical activity was reported and if there was a referral to the MOVE!® program for weight loss/management in predicting depression in the veteran population. One of the six

predicting factors of a positive PHQ-2 is an environmental factor (Table 21). The value of the $\text{Exp}(B)$ improves the odds that a positive PHQ-2 could occur within these independent factors.

Summary

In summary, 300 electronic charts were reviewed with only 140 included in the final data analysis. Although, the process of developing a theoretical model was not supported with the research findings, there are strong clinical indications for this veteran population.

CHAPTER VI

RESULTS/SUMMARY

The purposes of the study were to determine the prevalence of depression in a veteran's hospital in the southeastern section of the United States as measured by the patient health questionnaire-two times (PHQ-2) and to create a model for predicting depression based upon the results and associated biological, sociological, and environmental variables. It was hypothesized that there was a positive relationship with depression and biological, environment, and sociological factors. Findings of the study along with implication of nursing practice, limitations of the study and suggestions for future research are discussed in this chapter.

Implications for Nursing Practice

Patients experiencing depression often seek care from their primary care providers before presenting to a mental health provider (Saver et al., 2007). With this considered, nurses must develop and implement strategies to improve the recognition of depression, especially in the primary care setting. In the primary care setting, problems with the diagnosis of depression may occur because patients do not present with easily identifiable symptoms or have multiple medical and mental health comorbidities which compete for clinical attention (Klinkman, 2003).

This study supported and challenged a number of existing theoretical notions when diagnosing depression using the PHQ-2 assessment tool. According to Bulloch, Williams, Lavorato, and Patten (2009), marital status does not influence major depression. This study identified a connection between depression and marital status, the

branch of service the veteran served, their enrollment category for which benefits are determined and they were service connected. Medical factors, like diabetes and if the veteran is a smoker can also be predictors of depression. Genetically (Fu et al., 2007) connected the influence of depression to nicotine dependence. Performing a logistic regression to analyze the association between the factors, the environmental factor were found to be causal for some depressive symptoms. In addition, it was concluded that depression decreases the changes of an individual's smoking cessation.

A combination of Donabedian's Quality of Life model and Shaver's *Biopsychosocial View of Human Health* models comprised the conceptual underpinnings for this study. To support the model, the goals were to identify a significant relationship between a positive PHQ-2 and the independent variables. Contrary to expectations, there was no significant data to support the relationship between depression and biopsychosocial factors. While the PHQ-2 is reliable for diagnosing depression, this research was not successful in supporting a predictive model for depression in the veteran population. With additional research, the findings of the study would have implications for nursing practice in the primary care setting.

Limitations

Several limitations of this study should be noted. The first limitation was the use of a convenience sample which included selection and response bias. The available sample size was smaller than ideal; therefore the study could have been underpowered. The data were not always available in the electronic records and thereby limited the validity of the findings. The level of comorbidity (diabetes, hypertension, cardiovascular

disease) in the sample might have limited generalizability to other population. The data collection tool and methods chosen to assess PHQ-2 results was another limitation.

Recommendations

Recommendations for Primary Care Providers and Institution

The first recommendation would be the additional of a mental health nurse practitioner (MHNP) in each primary care clinic. Once a positive depression screening is identified, the MHNP can aid in the diagnosis and treatment of the presenting symptoms. The MHNP would also be available for consultations as needed; therefore increasing the access to psychiatric providers to consult with or for which to refer their veterans. The advance practice nurse in the primary care community outpatient clinics could seek avenues to collaborate with the MHNP if not available locally.

Recommendations for the primary care clinic are to have the PHQ-2 available in the waiting room since this is a self-reported tool. This may also include literature like posters and brochures readily available in the reception area. This may also improve the patient's willingness to seek help since it is evident the stigma, guilt and shame may be barriers to depression recognition. The primary care provider should educate the veteran on the myths and misconceptions about depression and answer any questions or concerns.

Lack of time is another important barrier to address for the primary care provider. In the facility included in the study, the veteran often encounters two to three staff members before their visit with the primary care provider. To address this lack of time, there is a need for more mid-level providers in the primary care clinic to evaluate and treat the veterans. If the tool is completed by the supporting staff, the primary care

provider should be alerted verbally. If the primary care provider cannot address the concerns during that visit, another visit could be rescheduled within the next month.

The completing of the preventive screening to be completed annually is mandated within the Veteran Affairs Medical Center. There needs to be some type of procedure in place to monitor the completion of the screens more frequently, instead of quarterly. This individual could be a supporting staff member, not an advance practice nurse, who can be trained on the measures.

Recommendations Future Research

The measurement of client outcomes and documentation of evidence-based practice is essential in identifying and diagnosing depression in the primary care setting. Future research should be designed to examine questions regarding the structural process of diagnosing depression early. A second area of further study is if the female and male veterans identify their depressive symptoms differently. Larger studies are needed to address the relationship between the branch of services and depression. Studies including a variety of psychiatric diagnoses are also needed. A replication of the study with a larger sample from multiple primary care clinics in different regions of the country would be worthwhile.

Future research can help to standardize measures to evaluate the outcome of care provided by the advance practice nurse in the primary care setting. It would be important to verify whether or not primary care providers are over-assessing or over-treating depression. If this is discovered, it would be further to investigate the potential causes. Information from such studies would be valuable in shaping guidelines for advance nurse

practice and training within the primary care setting. Assessment measures other than self-reported questionnaires would decrease the possibility of self-bias or distortion.

An additional recommendation would be replication of this study with a non-veteran population, especially women. These participants may provide additional data to address the depression and possible contributing factors. In addition to non-veteran women, it would be beneficial to duplicate the study with more women veterans as it might offer a different view of the contributing factors to depression.

Future research is also needed to explore the cause of mild depression and if there is a possible relationship with genetic or even behavior issues like low self-esteem. The researcher also recommends further testing of the socioeconomic status with the various branches of services and the diagnosis of depression. Again, a larger study will be needed.

There could also be a relationship between culture in the primary care advance practice nurses and depression that need to be researched. Additional research is needed to explore the perceptions of advance practice nurse about psychiatric mental health nurse practitioners in the primary care setting. To fully understand the complexities of assessing, treating and referring depressed patients for further mental health evaluation, the perception and practices of primary care providers needs to be understood.

The perception of the veterans seeking mental health care would be another area to explore. With the stigma already attached to mental health, there are some veterans who do not report symptoms because of the fear of being *labeled*. The future research would help to educate and address some of the myths surrounding mental illness.

An exploratory study should be conducted locally to investigate if the suicide committed shortly after their primary care visit applies to the government agency in this study. This would also address the factors contributing to the reluctance of veterans to discuss their mental health with their primary care provider.

With replication of this study and with either of the future research discussed, the recommendations would include a request with the IRB for longer than a year for the study and a larger sample size. To strengthen the study, the questions should be revised to include one or more descriptive research questions.

Conclusion

Depression affects a significant portion of the veteran population in the United States. Primary care providers are often the first place veterans will seek care for their mental health concerns; therefore exploring ways to enhance the care provided in the primary care setting would be very beneficial. Even so, Phelan et al. (2010) discussed the under diagnosis of depression in the primary care setting. Lack of or inadequate treatment for a depressive disorder could have devastating consequences and for this reason, treatment for veterans with depression is such an important need. The early diagnosis and treatment may offer the veterans a different coping mechanism.

The nurse practitioners are uniquely qualified to evaluate depression. The placement of a mental health nurse practitioner (MHNP) in the primary care setting will help enhance the services to this vulnerable population. The MHNP can address both the pharmacological and the interpersonal dimensions in the diagnosis and treatment of depression.

Although the Affordable Care Act does not change the care within the VA or other military health care systems, a number of provisions aimed at access to affordable coverage is included. It is this access to affordable care that could affect the veterans and their families. The Affordable Care Act expands Medicaid eligibility for individuals with incomes between 138 and 400 percent below the federal poverty levels.

The government has development mental health strategies with six shared objectives to improve the mental health and well-being of the nation. With early intervention and prevention being a driving force, emphasis is placed on the interconnection between mental health, housing, employment, and the criminal justice system (Department of Health, 2011). Patients can be screened by the providing asking two simple questions that require a yes or no. This will also give the health care professional an opportunity to help the veteran address their feelings and properly refer or treat if needed. With further research, there is an opportunity for increased knowledge of diagnosing and treating patient with mild depression.

APPENDIX A

PATIENT HEALTH QUESTIONNAIRE-TWO ITEMS

Name _____ Date _____

Over the past two weeks, how often have you been bothered by any of the following problems?

Circle the number which applies to you.

Little interest or pleasure in doing things:

0 –Not at all

1—Several days

2—More than half the days

3—Nearly every day

Feeling down, depressed or hopeless:

0 –Not at all

1—Several days

2—More than half the days

3—Nearly every day

From “The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener” by K. Kroenke, R. L. Spitzer and J. B. Williams, 2003, Medical Care, p. 1284-1292. Copyright © 1999 by Pfizer, Inc. Adapted with permission. PrimeMD® is a trademark of Pfizer, Inc.

APPENDIX B

CRITERIA FOR MAJOR DEPRESSIVE DISORDER

A. Five (or more) of the following symptoms have been present during the same two-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

NOTE: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.

(1) depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). **Note:** In children and adolescents, can be irritable mood.

(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)

(3) significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. **Note:** In children, consider failure to make expected weight gains.

(4) insomnia or hypersomnia nearly every day

(5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)

(6) fatigue or loss of energy nearly every day

(7) feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

(8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)

(9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

B. The symptoms do not meet criteria for a mixed episode.

C. The symptoms cause clinically significant distress or impairment in social,

occupational, or other important areas of functioning.

D. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).

E. The symptoms are not better accounted for by Bereavement, i.e., after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

APPENDIX C

THE PHQ-2 RESPONSE RECORD

CHART REVIEW:**Subject ID Number** _____**Missing Data Codes:** (ND) No Documentation**Number of Primary Care Visits from January 1, 2011 to December 12, 2011** _____**Date of Last Primary Care Visit** ____/____/____**Was Visit Scheduled:** Yes ____ No ____ Not indicated ____**Primary Care Provider: (Check one)**

1. Nurse Practitioner _____

2. Physician _____

PHQ-2 Score Positive ____ Negative ____**Biological Factors****Age:** _____**Gender:**

1. Male

2. Female

Race/Ethnic Background:

1. African American/Black

2. European American/Caucasian/White

3. American Indian

4. Hispanic/Latino

5. Asian American/Pacific Islander

6. Multiethnic (Please specify) _____

Weight ____ / **Height** ____ (BMI if calculated: ____)

Comorbid Conditions (Check all that apply)

Hypertension _____

Diabetes _____

Cardiovascular Disease _____

(As recorded on patient's electronic medical records, can be presently active or in the past history as illness which has been resolved)

Social Factors**Marital Status:**

1. Single, never married
2. Married
3. Widowed
4. Divorced or Separated

Employed: Yes _____ No _____**Highest Grade Completed** _____ (enter **ND** if not indicated)7th – 9th grade10th – 11th grade

High School Graduate or GED

Some College or Vocational Training

College Graduate

Master's Degree or higher

Current Military Status

1. Active duty
2. National Guard
3. Reserves
4. Veteran

Branch of Service

1. Air Force

3. Coast Guard

5. Navy

2. Army

4. Marine Corps

Means Score/Rating: Income Category ____

Health Insurance: Yes ____ No ____ N/A ____

Service Connection Yes ____ No ____ Percentage ____

Reason (s) for service connection: (Check type if yes)

Medical ____

Mental Health ____

Medical and Mental health Combined ____

Non-service Connected ____

Environmental Factors

Smoker Yes ____ No ____

Physical Activity documented: Yes ____ No ____

Referred to MOVE!® Program Yes ____ No ____

APPENDIX D

ENROLLMENT PRIORITY GROUP



IB 10-441
March 2012

Enrollment Priority Groups

Today's Veterans have a comprehensive medical benefits package, which VA administers through an annual patient enrollment system. The enrollment system is based on priority groups to ensure health care benefits are readily available to all enrolled Veterans. Complementing the expansion of benefits and improved access is our ongoing commitment to providing the very best in quality service. Our goal is to ensure our patients receive the finest quality health care regardless of the treatment program, regardless of the location. Enrollment in the VA health care system provides Veterans with the assurance that comprehensive health care services will be available when and where they are needed during that enrollment period.

Priority Group	Definition
1	<ul style="list-style-type: none"> • Veterans with VA-rated service-connected disabilities 50% or more disabling • Veterans determined by VA to be unemployable due to service-connected conditions
2	<ul style="list-style-type: none"> • Veterans with VA-rated service-connected disabilities 30% or 40% disabling
3	<ul style="list-style-type: none"> • Veterans who are Former Prisoners of War (POWs) • Veterans awarded a Purple Heart medal • Veterans whose discharge was for a disability that was incurred or aggravated in the line of duty • Veterans with VA-rated service-connected disabilities 10% or 20% disabling • Veterans awarded special eligibility classification under Title 38, U.S.C., § 1151, "benefits for individuals disabled by treatment or vocational rehabilitation" • Veterans awarded the Medal Of Honor (MOH)
4	<ul style="list-style-type: none"> • Veterans who are receiving aid and attendance or housebound benefits from VA • Veterans who have been determined by VA to be catastrophically disabled
5	<ul style="list-style-type: none"> • Nonservice-connected Veterans and noncompensable service-connected Veterans rated 0% disabled by VA with annual income and/or net worth below the VA national income threshold and geographically-adjusted income threshold for their resident location • Veterans receiving VA pension benefits • Veterans eligible for Medicaid programs

6	<ul style="list-style-type: none"> • World War I Veterans • Compensable 0% service-connected Veterans • Veterans exposed to Ionizing Radiation during atmospheric testing or during the occupation of Hiroshima and Nagasaki • Project 112/SHAD participants • Veterans who served in the Republic of Vietnam between January 9, 1962 and May 7, 1975 • Veterans of the Persian Gulf War that served between August 2, 1990 and November 11, 1998 • Veterans who served in a theater of combat operations after November 11, 1998 as follows: <ul style="list-style-type: none"> o Currently enrolled Veterans and new enrollees who were discharged from active duty on or after January 28, 2003, are eligible for the enhanced benefits for 5 years post discharge <p>Note: <i>At the end of this enhanced enrollment priority group placement time period Veterans will be assigned to the highest Priority Group their unique eligibility status at that time qualifies for.</i></p>
7	<ul style="list-style-type: none"> • Veterans with gross household income below the geographically-adjusted income threshold (GMT) for their resident location and who agree to pay copays
8	<ul style="list-style-type: none"> • Veterans with gross household income above the VA national income threshold and the geographically-adjusted income threshold for their resident location and who agrees to pay copays <p>Veterans eligible for enrollment: Noncompensable 0% service-connected and:</p> <ul style="list-style-type: none"> o Subpriority a: Enrolled as of January 16, 2003, and who have remained enrolled since that date and/or placed in this subpriority due to changed eligibility status o Subpriority b: Enrolled on or after June 15, 2009 whose income exceeds the current VA National Income Thresholds or VA National Geographic Income Thresholds by 10% or less <p>Veterans eligible for enrollment: Nonservice-connected and:</p> <ul style="list-style-type: none"> o Subpriority c: Enrolled as of January 16, 2003, and who have remained enrolled since that date and/or placed in this subpriority due to changed eligibility status o Subpriority d: Enrolled on or after June 15, 2009 whose income exceeds the current VA National Income Thresholds or VA National Geographic Income Thresholds by 10% or less <p>Veterans not eligible for enrollment: Veterans not meeting the criteria above:</p> <ul style="list-style-type: none"> o Subpriority e: Noncompensable 0% service-connected (eligible for care of their SC condition only) o Subpriority g: Nonservice-connected

APPENDIX E

VA NATIONAL INCOME THRESHOLDS



VA HEALTH CARE

Fact Sheet 164-10

December 2010

VA National Income Thresholds

Financial Test Year 2011

Veteran with	Free VA Prescriptions and travel benefits (maximum allowable rate):	Free VA Health Care: (0% service connected {noncompensable} and nonservice-connected veterans only):	Medical expenses deduction (5% of maximum allowable pension rate from previous year):
0 dependents	\$11,830 or less	\$29,402 or less	\$592
1 dependent	\$15,493 or less	\$35,284 or less	\$775
2 dependents	\$17,513 or less	\$37,304 or less	\$876
3 dependents	\$19,533 or less	\$39,324 or less	\$977
4 dependents	\$21,553 or less	\$41,344 or less	\$1,078
For each additional dependent add:	\$2,020	\$2,020	5% of maximum allowable pension rate
Medicare Deductible: \$1,132		Income & Asset Net Worth: \$80,000	

Financial Test Year 2010

Veteran with	Free VA Prescriptions and travel benefits (maximum allowable rate):	Free VA Health Care: (0% service connected {noncompensable} and nonservice-connected veterans only):	Medical expenses deduction (5% of maximum allowable pension rate from previous year):
0 dependents	\$11,830 or less	\$29,402 or less	\$592
1 dependent	\$15,493 or less	\$35,284 or less	\$775
2 dependents	\$17,513 or less	\$37,304 or less	\$876
3 dependents	\$19,533 or less	\$39,324 or less	\$977
4 dependents	\$21,553 or less	\$41,344 or less	\$1,078
For each additional dependent add:	\$2,020	\$2,020	5% of maximum allowable pension rate
Medicare Deductible: \$1,100		Income & Asset Net Worth: \$80,000	

APPENDIX F

IRB APPROVAL: VA MEDICAL CENTER

Assoc Ch of Staff

G.V. (Sonny) Montgomery VAMC (586)

1500 E. Woodrow Wilson Avenue • Jackson, MS 39216 • 601-364-1315 • Fax: 601-364-1390

APPROVAL - Initial Review

Date: August 17, 2012

From: Kent A. Kirchner, M.D., Executive Secretary

Investigator: Nita A. Magee, RN, MSN, Ph.D.

Protocol: Toward a Model for Predicting Depression Among Veterans

ID: 00459 Prom#: N/A Protocol#: N/A

SRS Approval: Not applicable. This protocol does not have a safety component.**IACUC Approval: Not applicable.****IRB Approval: 8/2/2012; Expires: 8/1/2013****R&D Approval: 8/16/2012****R&D Acceptance of Summary of Approvals: 8/16/2012**

- 1. The above referenced Initial Review submission was fully approved by all required committees on the dates indicated above. You are now authorized to begin work on this project.**
- 2. Please refer to the attached committee approval memos for details regarding approval expiration dates. The maximum duration of approval is one year. Continuation of this study beyond a stated expiration date will require committee review and approval prior to that date.**
- 3. All material from this study that is submitted for presentation or publication must also be submitted to the R&D Committee for review. In addition, the VA must be acknowledged on all published materials. Failure to do so may result in the withdrawal of VA funds. The policy is available at: http://www1.va.gov/vhapublications/ViewPublication.asp?pub_ID=1766.**
- 4. No changes or modifications may be made to this study until you have requested and received full approval from all applicable committees.**
- 5. All study personnel must remain current with all applicable training and compliance requirements. Non-compliant employees may not work on any project. Non-compliance by the principal investigator may result in study termination.**
- 6. Any loss or theft of VA sensitive data or media containing sensitive data must be immediately reported to the Jackson VAMC ISO and PO.**
- 7. Thank you for your cooperation in helping us adhere to the rules and regulations of the Department of Veterans Affairs for the conduct of research.**

8. If you have any questions or need additional information, please contact the R&D Administrator/Research, 601-362-4471 extension 1123.



Kent A. Kirchner, M.D., Acting ACOS/R, Executive Secretary

APPENDIX G

IRB APPROVAL



THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **12100201**

PROJECT TITLE: **Toward a Model for Predicting Depression Among
Veterans by Patient Health Questionnaire (PHQ-2)**

PROJECT TYPE: **Dissertation**

RESEARCHER/S: **Nita Magee-Cornelius**

COLLEGE/DIVISION: **College of Health**

DEPARTMENT: **Nursing**

FUNDING AGENCY: **N/A**

IRB COMMITTEE ACTION: **Expedited Review Approval**

PERIOD OF PROJECT APPROVAL: **10/04/2012 to 10/03/2013**

Lawrence A. Hosman, Ph.D.
Institutional Review Board Chair

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